RESEARCH ARTICLE

ANALYSIS OF RISK FACTORS AFFECTING NEONATAL MORTALITY: UNVEILING THE HIDDEN AGONY

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ARTICLE INFO	ABSTRACT
	Introduction: According to figures from August 2011, neonatal period, and accounts for 41% of all child deaths before the age of five. That share grew from 37% over the last decade, and is likely to increase further. New-born deaths dropped from 4.6 million in 1990 to 3.3 million in 2009, but fell only slightly during the last decade. The present study attempt to highlight the factors affecting neonatal mortality for better understanding of causes in order to decrease the NMR. **Objective:** 1. To study the effect of neonatal factors on their survival. 2. To give evidence based recommendations. Methodology-All of the patients registered at SNCU of MKCG Medical College& Hospital during the study duration constituted the sample size. The information on the study subjects was obtained by making regular visits to the SNCU, like-wise the outcome the cases were collected by follow ups. **Results:** A total of 412 cases died of different causes, in which HIE (40.54%) contributes to majority of the deaths followed by prematurity (24.28%) and infection (15.3%). About 26.7% of the cases died within 24 hours/1day. Majority (60.8%) of the sick neonatal deaths were within 1 week. Out of 1366 males, 304 (22.25%) died and 676 females, 108 (15.98%) died. Deaths were more in preterm (46%) and low birth weight (21.7%) babies compared to term (12.72%) and normal birth weight babies (18.13%). **Conclusion:** HIE and prematurity are the priority causes of neonatal mortality and neonates of male sex, LBW, preterm and less than 7 days old are more prone for death & faulty feeding practices is one the contributing factor for the neonatal mortality.

INTRODUCTION

In India neonatal health is always been the neglected issue at higher level where policy and programs are made to improve the health of mother and child in order to achieve the targets. As well as at lower level where people are unaware, ignorant about child birth and newborn care which is very crucial period of life & should be given more attention. Most of neonatal deaths are not recorded. A lack of continuity between maternal and child health programmes has meant that neonatal health is the most neglected issue. However some programmes like JSSK, NSSK, and IMNCI etc. are trying to fill the gap between care of the mother and care of the child. More investment into health care for women and children since 2000 when MDGs were set resulted in more rapid progress for the survival of mothers (2.3% per year) and under-five children (2.1% per year) than for new-born (1.7% per year) (http://www.who.int/pmnch/media/press_materials/fs/fs_newborndealth_illness/en/)

The present study attempt to highlight the factors affecting neonatal mortality for better understanding of neonatal health contributing for Nation's health.

Objective

- To study the effect of neonatal factors on their survival.
- To give evidence based recommendations.

MATERIALS AND METHOD

Study Design: Hospital based observational Study

Study Duration: 2years

Study Area: Sick New born Care Unit

Study population: Sick neonates who got admitted to SNCU, MKCG Medical College, Berhampur.

Sampling: All of the patients registered at SNCU during January 2011 to June 2012 constituted the sample size.

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METHODOLOGY

The information was collected by visiting the SNCU regularly. The clinical profile along with treatment offered as well as the lab investigations were collected from the case registers. Likewise the outcome the case was obtained by the subsequent follow up visits. The mortality profile of each case was obtained by interviewing parents /responsible adults along with staff of SNCU who had accompanied the case. All the data were compiled and analyzedafter that. Analysis: Use of Proportions, Percentages and appropriate Test of significance

RESULTS

Mortality Profile of cases

Table 1. Mortality Profile of Study population:

Causes of Death	Number of death(n=412)	Percentage (%)
HIE	167	40.54%
Prematurity	100	24.28%
Infection	63	15.30%
Cong Malformation	29	07.03%
MAS	13	03.15%
RDS	10	02.43%
Others	29	07.03%
Cause not known	1	00.24%
Total	412	100.00%

Neonatal illness has a variety of clinical pictures, from acute to chronic, from mild to severe form and simple fever to life threatening failure to thrive & death. Out of all 2042 cases 412 cases died during the study period. Most common cause of death was hypoxic ischemic encephalopathy (40.54%), it was followed by prematurity (24.28%) and Infection (15.3%). Around 7.03% died of congenital malformation, 3.15% of meconium aspiration syndrome and 2.43% of respiratory distress syndrome. In 0.24% cases cause was not known. About 7.03% cases died of other causes. According to the National Road Map Strategic Plan (April 2008) at Tanjania (http://www.who.int/pmnch/countries/tanzaniamapstrategic.pdf) 79% of newborn deaths are due to three main causes: infections including sepsis/pneumonia (29%), birth asphyxia (27%); and complications of preterm birth (23%). In a study by Baqui *et al.* (2006) it was found that the primary cause of death on first day of life were birth asphyxia or injury (32%) and preterm births (26%).During days 1-6 the most important causes were preterm births (30%) and sepsis or pneumonia (25%).

According to Indian Council of Medical Research (medind.nic.in/ibv/t08/i12/ibvt08i12p991.pdf) preliminary analysis of verbal autopsy data on 161 cases of neonatal deaths revealed that prematurity (16.8%), birth asphyxia (22.3%) and infections including septicemia, pneumonia, meningitis and other infections (32.8%), were the predominant causes of deaths. Similar finding by Lahariya (2010) which suggests that the median percentage of causes of deaths in neonatal period were sepsis/pneumonia: 24.9% (Q1: 19.6% and Q3: 33.4%); asphyxia: 18.5% (Q1: 14.2% and Q3: 21.9%); and prematurity/LBW: 16.8% (Q1: 12.5% and Q3: 26.5%). During the study, it was found that 26.7% of the sick neonates died within 24 hrs. Or 1st day of their life. Majority (60.8%) of sick neonates died in the 1st week and only 12.5% died after surviving the early neonatal period. These figures points towards the vulnerability of neonates towards death during the 1st week of life with maximum risk during the 1st day.

Table 2. Age at the time of death:

Age of the Neonate	Number of Death(n=412)	Percentage (%)
<1 day	110	26.70%
1-6day	250	60.80%
>7 day	52	12.50%
Total	412	100.00%

A study on "Retrospective analysis of neonatal deaths and stillbirths in five hospitals in Guyana" (https://www.unicef.org/guyana/ Neonatal_report (1).pdf) revealed that a total of 127 charts were reviewed, 77 were neonatal deaths and 50 were stillbirths. Sixty three (82%) of the neonates died within the early neonatal period, that is, 7 days after delivery, 10 (13%) died during the late neonatal period and the time of 4 (5%) neonatal deaths was not stated. Christiana Titaley (2008) observed that about 54.7 per cent of infant deaths occurred during the neonatal period, of which approximately 29.9 per cent occurred on the first day and 75.6 per cent occurred in the first week of infant life. According to Indian Council of Medical Research (medind.nic.in/ibv/t08/i12/ibvt08i12p991.pdf) it was found that three fourths (74.1%) of neonatal deaths and half (50.8%) of infant deaths occurred in the early neonatal period. Of all neonatal deaths, 39.3% occurred on the first day of life and 56.8 % during the first three days. Likewise a population-based study in rural Bangladesh conducted by Hafizur R Chowdhury *et al.* (2011) revealed that, Of the 365 deaths recorded during 2003 and 2004, 84% died in the early (0-7 days) neonatal period, with the remaining deaths occurring over the subsequent 8 to 28 days. Mortality Profile of cases according to sex, gestational age and birth weight:

Out of 1366 males, 22.25% (304) died and 676 females, 15.98% (108) died. The case fatality rate for males was higher (22.25) compared to females (15.53). The two-tailed P value equals 0.0009 and the association between sex of the child and death due to different causes is considered to be extremely statistically significant. This could be due to either biological fragility of male babies or higher number of admission of male neonates than females which shows gender disparity. People are more aware and conscious about the health of a male baby compared to female who are unattended most of the times. This was also suggested in the study by Christiana R Titaley (2012) observed that. There was a significant 49 per cent increased odds of neonatal death for males compared with females. Caroline A Onwuanaku (2011) observed that out of 278 neonates studied, twelve of the babies died. Seven (2.52%) and 5(1.80%), of them being males and females respectively. The neonatal mortality rate by gender was not significant (p > 0.05). The neonatal mortality was 25.2 deaths per 1000 live births for boys and 18.0 for girls. According to Child Health Research Project Special Report (Child Health Research Project Special Report, 1999) Boys had a 26% higher risk of dying than girls. Out of total 1454 term neonates, only 12.72% neonates died whereas the proportion of death in neonates among all the 493 preterm babies was found to be more i.e 46%. The two-tailed P value is less than 0.0001 and the association between gestational age and neonatal mortality is considered to be extremely statistically significant. Hashima-E-Nasreen. (Hashima, 2006) found in the study that prematurity and low birth weight were associated with 13 and 2 times increased risk of neonatal mortality respectively. A study by Ali Keshtkaran (2007) which showed that, the ratio of death to live births was 6.99/1000 with the mortality of

Table 3. Sex Vs Death

Sex	Cases cured/referred or left		Death		Total	
Male	1062	77.75%	304	22.25%	1366	66.89%
Female	568	84.02%	108	15.98%	676	33.11%
Total	1630	79.84%	412	20.18%	2042	100.00%

Table 4. Gestational week Vs Death

Gestational Age	Number of cases cured/left or referred		Number of deaths		Total	
Term	1269	82.28%	185	12.72%	1454	74.68%
Preterm	266	54.00%	227	46.00%	493	25.32%
Total	1535	78.84%	412	21.16%	1947	100.00%

Table 5. Birth Weight Vs Death

Birth Weight	Number of cases cured/left or referred		Number of deaths(n=412)		Total	
>2500 gm.	718	81.87%	159	18.13%	877	42.95%
1500-2499 gm.	625	80.34%	153	19.66%	778	38.09%
1000-1499 gm.	235	78.20%	63	21.80%	298	14.60%
<1000 gm.	52	58.43%	37	41.57%	89	04.36%
Total	1630	79.84%	412	20.18%	2042	100.00%

Table 6. Breast feeding practices Vs Neonatal death

Breast feeding practices	Number of cases cured/left or referred		Number of deaths		Total	
Proper and Adequate	380	89%	47	11%	427	20.92%
Improper and Faulty	1250	77.4%	365	22.6%	1615	79.08%
Total	1630	79.82%	412	20.18%	2042	100.00%

3.82/1000 was related to prematurity and 1.68/1000 due to congenital malformations rest due to LBW and birth injuries. The most common cause of neonatal death was prematurity (57.07%). It was supported by Caroline A Onwuanaku (2011) which concluded that gestational age is not a significant predictor of neonatal mortality (p = 0.595). Babies delivered at less than 37 weeks of gestation recorded a higher rate of mortality than those of 37 weeks and above (p = 0.000). The survival was higher among the babies having birth weight >2.5 kg compared to the babies with birth weight <2.5 kg. Whereas majority of the neonatal deaths were noticed in extremely low birth weight baby (41.57%), followed by very low birth weight and low birth weight babies. Similar finding obtained by Christiana Titaley (2012) which opined that birth weight remained as a strong predictor, with the odds for neonatal death for low birth weight infants (<2500 grams) was 5.5 times (95% CI: 3.59–8.57, p = 0.00) the odds for the normal weight infants (2500 – 3500 grams). Ali Keshtkaran, Vida Keshtkaran (2007) observed that the ratio of death to live births was 6.99/1000. 72.43% of them died in the first week of birth and 52% weighed less than 2500g. Caroline A Onwuanaku (2011) also noticed that birth weight unlike gender is a significant predictor of mortality, mortality being higher in neonates of <2.5 kg (OR = 0.04; 95% Cl 0.005-0.310, p = 0.002) (p = 0.453). Similarly Parveen Tariq (http://www.jpma.org.pk/full_article_text.php?article_id=3337) conducted a study which revealed that sixty 68% of mortality was contributed by low birth weight (LBW), 74% of them being preterm suggesting high mortality among LBW-preterm infants. When inquired about breast feeding practices among mothers of sick neonates, it was observed that mothers of 365 neonates out of 412 who died,did not practice proper and adequate breast feeding according to IMNCI guidelines. This might be attributed either by their lack of knowledge about adequate &proper breast feeding practices or by influence of their old familial customs, rituals and cultural habits.

Similar study by Huffman, (2001) revealed that breast feeding helps prevent hypothermia and hypoglycemia in newborn babies, which are contributory causes of early neonatal deaths especially among low birth weight and premature babies. Feeding colostrum and breast feeding, especially exclusive breast feeding, protects against late neonatal deaths. Likewise Cristiano Siqueira Boccolini; Márcia Lazaro de Carvalho; Maria Inês Couto de Oliveira; Rafael Pérez-Escamilla (2013) Showed that breastfeeding within the first hour of life was negatively correlated with neonatal mortality (Spearman's Rho = -0.245, p = 0.046), and this correlation was stronger among countries with more than 29 neonatal deaths per 1000 newborns (Spearman's Rho = -0.327, p = 0.048). Luke C. Mullany *et al*. (2008) found out in their study that partially breast-fed infants (72.6%) were at higher mortality risk (relative risk (RR) = 1.77; 95% CI = 1.32-2.39) than those exclusively breast-fed. There was a trend (P = 0.03) toward higher mortality with increasing delay in breast-feeding initiation. Karen M Edmond (2007) also observed the same, risk of death as a result of infection increased with increasing delay in initiation of breastfeeding from 1 h to day 7; overall late initiation (after day 1) was associated with a 2.6-fold risk (adjusted odds ratio (adj OR): 2.61; 95% CI: 1.68, 4.04). Partial breastfeeding was associated with a 5.7-fold adjusted risk of death as a result of infectious disease (adj OR: 5.73; 95% CI: 2.75, 11.91).

Conclusion

Common cause of mortality was hypoxic ischemic encephalopathy followed by prematurity and infection .This might be attributed to inadequate care during pregnancy, birth injuries resulted from poorly managed intra-natal care and lack of access to obstetric services. The risk of neonatal death was higher in early neonatal period being maximum at 1st day compared to late neonatal period.

There was also higher propensity of low birth weight in male neonates indicating biological fragility of male babies in their initial period of life. Likewise low birth weight babies were more prone to death at neonatal period and death rate was found to be increased as the weight of the baby decreased. The study revealed that majority of sick neonates admitted were term babies, but death was more prevalent among pre-term babies compared to term babies indicating less reporting of the preterm sick neonatal cases which actually need immediate attention. Majority of death were related to faulty feeding practices which should be taken care of by various awareness programmes.

Limitation

The study population being restricted to SNCU of a tertiary health care facility and other confounding factors like education & nutritional status of mother, socio economic status, delivery complication etc which could have some impact on neonatal health has not been considered in this study.

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