

Characteristics and Causes of Neonatal Mortality in Hospitalized Cases at Benghazi Children's Hospital (2013-2014)

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Authors' contributions

"This work was carried out in collaboration among all authors. Authors AR, SFE, HKE, AE and SAL designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors AE and RE managed the analyses of the study. Author RE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Neonatal morbidity and mortality are major global public health challenges with approximately 3.1 million babies worldwide dying each year in the first month of life. The vast majority of neonatal death occurs in developing countries.

Aims: This study was undertaken to assess the magnitude of neonatal mortality and identify the main causes and associated factors of neonatal mortality.

Methodology: A retrospective study of 5791 neonates was conducted in Benghazi children hospital from 1st January 2013 up to December 2014.

Results: During the two years of the study there were 5791 neonates admitted to neonatal unit of Benghazi hospital, out of them 389 died (6.7% of total neonatal admissions) accounting for 59.6% of the total Paediatric deaths within the same period, moreover approximately one neonate died every 48 hours throughout the study period. There was a slight predominance of male deaths 225

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(57.5%) over females 164 (42.5%). The majority of neonates were Libyan 365 (94%), 212 of them were born in Benghazi, while the remaining 177 from other cities. Preterm neonate accounted for 35% (138) of deceased neonates. The most common causes were lung diseases of prematurity (29%), sepsis (25%), Congenital Heart Diseases (12.5%), post-operative intestinal obstruction (7%), multiple congenital anomalies (7%), intractable convulsions (6.5%).

Conclusion: This study indicated that neonatal mortality represented the highest portion of all deaths reported at Benghazi children hospital during the study period. Lung diseases of prematurity was found to be the top leading cause followed by sepsis then congenital heart diseases. Male showed marginal predominance over female in this study. More than one third of deceased neonates were preterm.

Keywords: Neonatal death; preterm; lung diseases of prematurity; Benghazi children's hospital.

1. INTRODUCTION

Neonatal morbidity and mortality are major global public health challenges with approximately 3.1 million babies worldwide dying each year in the first month of life (the neonatal period) [1]. Neonatal period is considered to be a vulnerable period of infant life, during which infants are highly susceptible to illness and death. Approximately 40% of all childhood mortality in poor countries occur during this time [2]. The vast majority of neonatal death (99%) occurs in developing countries that lack both equipped and qualified facilities to care for neonatal morbidities, due to poverty and poor access to health services, with two thirds occurring in Africa and South East Asia. On the other hand, in many Western societies child death is an uncommon event, mostly occurring in hospital, and usually in an intensive care unit [3]. It is therefore clear that strategies to reduce neonatal mortality are mandatory in reaching the *Sustainable Development Goals* by the year 2030 which were built upon the achievements of the Millennium Development Goal 4 [4].

In regard to the causes of neonatal death, it varies from country to country and even from region to region in the same country. For instance, in central India state of Maharashtra the main risk factors for neonatal deaths were the followings: midwives were not uniformly available, drug supplies for routine care were not readily available and that the healthcare staff were not adequately trained and did not have the knowledge and skills for addressing the specific problems of neonates. The location and distance from the community of the healthcare facility did have an effect on the birth outcome where women had to travel long distances to reach a healthcare facility. Other associated factors include delay in initiation of breastfeeding, unhygienic cord care practices, inadequate

number of visits for antenatal care (ANC) and non-immunization of the mother against tetanus. [5] Whereas, the main causes of neonatal deaths in non-rural region of India are a pre-term delivery, sepsis and birth asphyxia [5].

Another study conducted in Washington, DC reported that pregnancy-related complications (e.g., complications of prematurity, congenital anomalies), delivery-related complications (e.g., asphyxia, birth injury) and infectious diseases were the main causes of neonatal death with a contribution of about one third for each. Whereas the most important underlying cause of neonatal mortality and morbidity was low birth weight (LBW), since it is found to be associated with 40 - 80% of neonatal deaths [6]. In Libya, there is a dearth of data on neonatal mortality. Only a few published studies reporting neonatal morbidity and mortality in this region were found.

1.1 Objectives

This retrospective study was undertaken to assess the magnitude of the problem and to identify the main causes as well as associated factors of neonatal mortality, with the aim to develop recommendations that could be a valuable resource for health practitioners who are in charge of providing health care to this vulnerable age group.

2. PATIENTS AND METHODS

Patient records were gathered retrospectively from neonatal ward at Benghazi children hospital to achieve the aim of the study. Benghazi children hospital is a public healthcare facility that receives the vast majority of neonatal cases in Benghazi. Moreover, complicated cases are referred to the hospital from the other towns in eastern Libya. The sample which included 5791 neonates were collected based on hospital file records. The information collected included:

history, clinical examination, investigation, treatment and outcome (cured and discharged or deteriorated and died). Purposeful sample was recruited in this study from 1st of January 2013 up to 31st of December 2014. The data were collected using the medical records of the ill neonates. Following data collection, the data were entered into a computer database using SPSS version 21 for analysis and displayed in appropriate tables and graphs. Data were summarized and expressed as frequencies and percentages. Significance of difference was tested by chi-square test and the results was considered significant when $P < 0.05$. Ethical approval was undertaken from the ethical committee in the Hospital prior to data collection, in addition this study contains no risk or exposure for the patients and the data kept anonymous to maintain the privacy of the patients and their personal information.

The following definitions were adopted:

- The perinatal period commences at 22 completed weeks of gestation and ends seven completed days after birth.
- The neonatal period begins with birth and ends 28 complete days after birth. Neonatal deaths may be subdivided into early neonatal deaths, occurring during the first seven days of life (0 to 7 days) and late neonatal deaths (7 to 27 days).
- The Preterm baby born before 37 weeks gestation.
- The Low birth weight (LBW) baby born with weight less than 2.5 kg.

3. RESULTS

Throughout the two years of the study period there were 5791 neonates admitted to neonatal unit of Benghazi hospital, out of them 389 died which represent 6.7% of total neonatal admissions, accounting for 59.6% of the total paediatric deaths within the same period, that is approximately one neonate died every 48 hours throughout the 2years. A slight predominance in male deaths 225 (57.5%) over females 164 (42.5%).

The majority of neonates were Libyan 365 (94%), with only 14 (6%) being non Libyan, 212 neonates were born in Benghazi, while the remaining 177 belong to other cities. It is noteworthy that 138 (35%) of deceased neonates were preterm. With regard to the causes of neonatal mortality (Fig. 1), the most common causes included the following:

1. Lung diseases of prematurity led to 113 neonatal deaths (29%): which included hyaline membrane disease (HMD) 26% of total deaths and bronchopulmonary dysplasia 3%
2. Neonatal sepsis caused 97 neonatal deaths (25%): pneumonia was evident in 53 neonates and meningitis in 5 neonates but other septic foci were not documented. However, criteria for "systemic inflammatory response syndrome" SIRS was only met in 88 neonates.
3. Congenital Heart Diseases (CHDs) were the 3rd leading cause of neonatal deaths, with 49 neonates (12%).
4. Post-operative complications lead to death of 30 cases (7%) in the surgical ICU "specifically operated intestinal obstruction"
5. Multiple congenital anomalies: in 27 neonates, represented 6.7% of total neonatal deaths.
6. Intractable convulsions were seen in 26 cases (6.5%) while 26 cases (6.5%) also died of neonatal Asphyxia due to "cord around the neck"
7. Dehydration was the cause of death in 8 cases (2%), 4 of them with severe gastro enteritis.
8. Intra ventricular haemorrhage was the cause of death in 7 cases (1.8%).
9. Six cases (1.5%) were reported as Inborn errors of metabolism.

With regard to the co-morbidities and parameters of neonatal deaths, Hypoxemia occurred in 116 of all death cases prior to their death. The majority of neonatal deaths happened in the 1st week of their lives "66%" and decreased gradually onward (Fig. 2).

Lumber puncture was done in 85 patients, with results being normal in 68 and abnormal in 17 cases. Meningitis severe to the extent that caused death was observed in 5 patients. Ventilator was used in 181 patients and it was not used in remaining 177.

4. DISCUSSION

In this study, the estimated neonatal mortality was 6.7% accounting for more than half (59.6%) of the total paediatric deaths in the hospital during the study period. It was impossible to calculate the total neonatal mortality rate (NMR), because the researchers found too many difficulties and obstacles in retrieving the vital statistic from the poorly archived municipality of Benghazi.

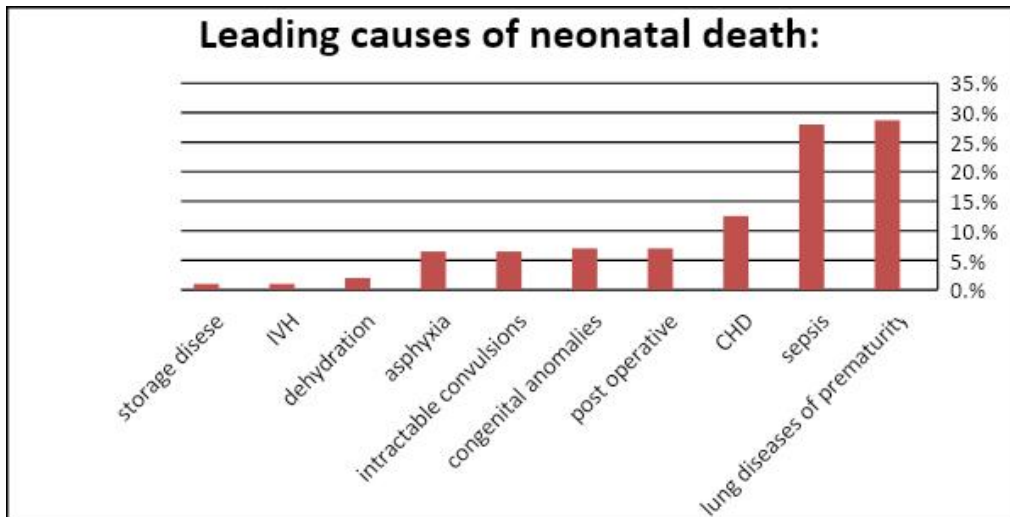


Fig. 1. Leading causes of neonatal death in the study sample

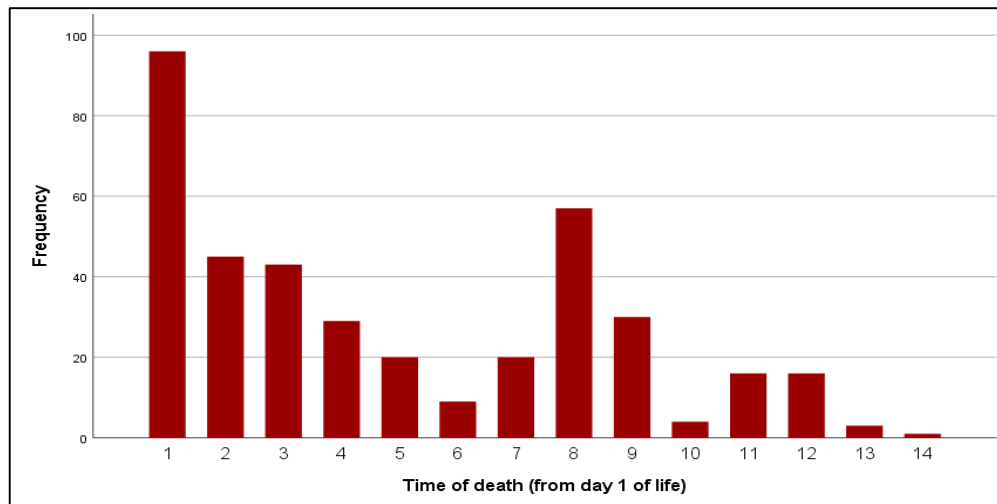


Fig. 2. Frequency of neonatal deaths within the first 2 week

A report issued from the United Nations Children's Emergency fund (UNICEF) in 2010, the data of which was adapted from the Countdown to 2015 report, mentioned that NMR in Libya was found to be 10 per 1000 live births. [7].

A study done in 2013 in city of Misruta, Libya found that NMR was 13.7 per 1000 live births. This study considered as the most recent published national study in this regard as far as the authors know, reported that the total number of deliveries were 6199 births, including 64 stillbirth and 6135 live births. 610 babies out of the total live birth were admitted to neonatal ICU after delivery; of them 67 babies (10.9%) died in

the first week of life and 46% of the first week deaths occurred in the first 24 hours [8].

Regarding the global figures, the results of the current study is in agreement with the global figures, although it was confirmed that NMR is decreasing, its rate of reduction has been substantially slower than the decreases in under five and maternal mortality [9]. In year 2000 neonatal deaths in many countries constituted 44% of all deaths in children under five years old. These statistics infer that it was unlikely to meet the child mortality target of the fourth Millennium Development Goal by 2015, at least partly because of inadequate neonatal mortality reductions [10].

In our study the leading cause of neonatal death was lung disease of prematurity (29% of total deaths), followed by sepsis (25%), in which pneumonia was the main focus of infection. The third most common cause of death among the study sample was congenital heart disease representing 12.5% of cases. This result is similar to many study results which revealed that infants born with severe congenital anomalies were at highest risk for neonatal death [11,12].

In Misruta, the main causes of early neonatal deaths were respiratory distress syndrome in 48%, congenital malformation 22%, neonatal sepsis 12%, CHD 12% and birth asphyxia 4%. While, the main causes of late neonatal deaths were neonatal sepsis 59%, congenital malformation 17%, birth asphyxia 12%, CHD 6% and Intravascular haemorrhage 6%. About 24 (29%) of death were full term and 60 (71%) were preterm [7].

According to a study published in 2013 to address the causes of death for the early and late neonatal periods for 194 countries from 2000-2013, the results revealed that the leading causes of neonatal death were preterm (35.7%), intrapartum complications (23.4%), and sepsis (15.6%), accounting for 2.1 (uncertainty range: 1.4-2.8) of the 2.8 million neonatal deaths [13]. In comparison with the present study there was a large similarity in the top leading causes of neonatal mortality.

5. STUDY LIMITATION

We could not determine the number or the causes of neonatal deaths that happened outside the hospital. Although these deaths could not be determined, the present data clearly illustrate the situation of this city, which may contribute to making health-policy in this area.

6. CONCLUSION

Neonatal mortality represented the highest proportion of all deaths reported at Benghazi children Hospital during the study period. Lung diseases of prematurity was found to be the top leading cause followed by sepsis then congenital heart diseases. Male showed marginal predominance over female in this study and more than one third of deceased neonates were preterm.

7. RECOMMENDATIONS

- Improvement of antenatal and maternal care is the basic intervention needed to

reduce maternal, fetal, and neonatal mortality, this will reduce LBW and preterm infants.

- Improvements in data base and keeping detailed records of neonatal mortality and causes of death is an important action that may facilitate subsequent researches.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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