Original Article

Death rates and causes among admitted neonates in Children Welfare Teaching Hospital – Medical city –Baghdad (2000- 2004)

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Summary:

Background: The neonatal deaths account for two-third of all deaths in the first year of life, and 40% of under-five mortality. Extreme prematurity, respiratory distress syndrome , neonatal infections , and congenital malformations are among the common causes of neonatal deaths.

Methods: We retrospectively studied 668 neonates who died over 5 years period from first of Jan. 2000 to the end of Dec. 2004 in neonatal care unit of children Welfare Teaching Hospital-medical city, by obtaining data from reviewing their medical records and death certificates.

Results: The death rate in neonates admitted to SCBU (special Care baby Unit) during the period of study was (10.7%), male constituted 432 (64.7%) and female 236 (35.3%) with male to female ratio 1.8:1. The major causes of death were congenital malformations (41.6%), neonatal infections (33.4%),and prematurity (10.3%).

Conclusions: There was no decline in the neonatal death rate in our hospital especially from sepsis and prematurity and low birth weight. Death due to late onset sepsis was lower than that due to early onset sepsis .There was a significant increase in the death from congenital malformations.

Keywords: Death Rate, Neonate, causes of death.

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Introduction:

The infant mortality rate (per 1000 live births) is a common index for measuring the standard of health and medical services (1).There are two components of infant mortality; neonatal mortality and post neonatal mortality (2).The neonatal deaths account for two-third of all deaths in the first year of life, and 40% of under-five mortality (3). As infant mortality declines, the proportion of neonatal deaths has been increasing because of the failure to address their causes (4). Neonatal mortality rate is defined as the number of neonatal deaths/ 1000 live births (5).Early neonatal death is the death of a live born infant during the first 7 completed days of life (6).Late neonatal death is the death of a live born infant after 7 but before 28 completed days of life (5,6). Currently, a limited number of problems commonly account for neonatal death: Extreme prematurity usually implies a neonate weighing less than 750g and/or less than 26 weeks gestation is associated with a high mortality risk, although survival has increased considerably in recent years (5). Respiratory Distress Syndrome (hyaline membrane disease) accounted for a further sizable proportion of deaths of somewhat larger and more mature babies, who nevertheless are usually less than 32 weeks gestation, but with the availability of exogenous surfactant, deaths from Respiratory Distress Syndrome are uncommon (5). Intraventricular hemorrhage accounts for a large number of deaths in this category, although this number has been decreasing as we learn about ways to prevent it (5).

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Neonatal Infection continues to play a significant role in neonatal deaths and may be due to pneumonia, sepsis, meningitis, or viral syndromes (5). In the 1990s, improvements in neonatal intensive care have decrease the morbidity and mortality from early onset sepsis in term infants. Preterm infants, however, remain at high risk for both early onset sepsis and its sequelae. They are also at risk for nosocomially acquired sepsis (7). Congenital malformations: Only a few multiple congenital anomalies are life threatening in the neonatal period. It is important to note, however, that malformations are the most common cause of death at this critical point in the life span (6). Approximately 20 to 30% of neonatal deaths are accounted for by congenital malformation that are incompatible with life, and this percentage may be increasing as other causes decrease (5). Asphyxia continues to be implicated in a number of intrapartum or neonatal deaths (5). Of the 4 million neonatal deaths that occur worldwide each year, 99% of these occur in developing countries and about 42% of these deaths are due to infections. Other major causes include perinatal asphyxia (21%), birth injuries (11%), prematurity and low birth weight (10%) and congenital abnormalities (11%).The low and middle-income countries must urgently review their existing programs, and design and implement improved, integrated action plans for maternal, newborn and child health. (8, 9) In Iraq, among neonates, the leading cause of death was cough/and or difficulty in breathing in (42.3%), followed by sudden death in (11.9%), congenital abnormalities in (10.3%) and prematurity in (10.2%). (10)Aim of study: This study

aimed to identify death rates and causes of death among neonates admitted to Children Welfare Teaching Hospital – medical city –Baghdad, throughout 5 years period from first of Jan. 2000 to the end of Dec. 2004.

Patients and Methods:

A retrospective study included all neonates who died over 5 years period from Jan. 2000 to the end of Dec. 2004 in neonatal care unit of Children Welfare Teaching Hospital /Medical city - Baghdad. This hospital is tertiary referral one that received patients from primary health centers , other hospitals in Baghdad and other cities of Iraq and from private clinics and hospitals.The data were obtained from reviewing the medical records included: name, date of birth, age on admission, sex, residency, birth weight and body weight on admission, gestational age, site and type of delivery, indication for admission, age on death and the cause of death as mentioned in neonates` case sheets and documented in the death certificate. All preterm and full term neonates (0-28 days), of all body weights and of medical and surgical causes of admission were included. Statistical analysis was done by demonstrating the number and percentage of deaths in each year and the average of all 5 years. Also the number and percentage of major causes of deaths and that of congenital malformations, and prematurity and low birth weight.

Results:

The total number of admitted children to the hospital during the 5 years period of study was 48552.The total number of neonates admitted to the SCBU during these 5 years was 6244,and the total number of deaths during the same period was 668, and the average neonatal death rate is (10.7%). (Table 1) The number of dead males was 432 (64.7%), while for females was 236 (35.3%). So the male to female ratio was 1.8:1. The congenital malformations, neonatal infections and prematurity were the major causes of death in neonatal period forming 570 (85.3%) of total death. (Table 2) The leading cause of neonatal death was congenital malformations which represents 278 (41.6%) from all neonatal deaths, and the most common type of congenital anomaly was gastrointestinal anomaly which represent 246 (88.5%) of all congenital anomalies (mainly Tracheoesophageal fistula associated with Esophageal atresia which represent 135 (48.5%)).Other anomalies were renal anomalies, congenital heart disease and multiple congenital anomalies. (Table 3) The second cause of neonatal death was neonatal infections 223 (33.4%). Neonatal sepsis was the major cause of deaths due to neonatal infections, which represents 187 (83.8%), followed by pneumonia 24(10.8%), and meningitis 12(5.4%). The total number of death from neonatal sepsis was 187 including 123 males and 64 females, with male to female ratio of 1.9:1. The majority of deaths due to sepsis occurred in low birth weight 135 (72%), especially in premature babies. Death due to late onset sepsis was lower than that due to early onset sepsis 65 (34.7%) Vs 122 (65.3%). The majority of deaths due to sepsis were associated with normal vaginal delivery 163 (87%), versus caesarian section delivery 24 (13%). The third cause of neonatal death was prematurity. The total number of dead premature neonates was 186 (10.3%), but only 69 (37%) of them died from prematurity alone as stated in case sheets and death certificates. The other 117 (63%) represent deaths of premature babies from other causes. Regarding birth weight ,all the 15 extremely premature babies (100%) admitted to the SCBU (birth weight < 750g) died, but only 14 (14.3%) from 98 babies (birth weight > 1000g - < 2.500 kg) died. (Table 4). The other causes of death were respiratory distress syndrome which represent 45 (6.8%), asphyxia and other CNS causes represent 53 (7.9%) of all neonatal deaths (including 3cases were diagnosed as intraventricular hemorrhage, one case as ventriculitis and 2 cases as repeated attacks of fit).(Table 2)

Table 1: Distribution of number of deaths according to year with death rate per year

Year	Total no. of admissions to hospital	No. of admissions to NICU	No. of deaths per year	Death rate %
2000	7194	1272	172	(13.5%)
2001	9177	1052	72	(6.9%)
2002	11711	1188	128	(10.8%)
2003	9982	1096	124	(11.3%)
2004	10488	1636	172	(10.5%)
Total	48552	6244	668	(10.7%)

Table 2: Causes of death.

Causes		No. of deaths	Percentage
I	Congenital malformations	278	(41.6%)
II	Neonatal infections	223	(33.4%)
III	Prematurity	69	(10.3%)
IV	Asphyxia and other CNS causes	53	(7.9%)
V	Respiratory Distress Syndrome	45	(6.8%)
	Total	668	(100.0)

Table 3: Congenital anomalies.

	Type of anomalies	No. of deaths	Percentage
I	Gastrointestinal anomalies:-	246	(88.5%)
	a. Tracheoesophageal Fistula and Esophageal atresia	135	(48.5%)
	b. Intestinal obstruction and Imperforate anus	57	(20.5%)
	c. Gastroschisis and Omphalocele	46	(16.6%)
	d. Diaphragmatic hernia	8	(2.9%)
II	Renal congenital anomaly	12	(4.3%)
III	Congenital heart disease	8	(2.9%)
IV	Multiple congenital anomalies	12	(4.3%)
	Total	278	(100.0)

Table 4:Death from prematurity according to birth weight.

Birth weight	No. of premature babies	No. of deaths	Percentage from premature babies deaths alone	Percentage from total
< 0.750 kg	15	15	(100%)	(8%)
> 0.750kg - < 1kg	73	40	(54.8%)	(21.5%)
> 1kg - <2.5kg	98	14	(14.3%)	(7.5%)
Total	186	69		(37%)

Discussion:

This study showed that the neonatal death rate was (10.7%). This result is still high but lower than a study done in the NICU in Abha, Saudi Arabia 2002-2003 (22.4%) (11), (probably because they were caring for more preterm and low birth weight neonates while we were caring for more mature and larger body weight , and also may be they were including all neonates from labor room and operating theaters, while we included only referred neonates). Also the result of this study was lower than a study done in Tanzania tertiary care referral hospital 2003 (19%) (12), and a study done in three rural African villages in 1997 (15%) (13), also it was lower than a study done among out born neonates at 10 tertiary care institutions in India during the year 2000 (16.4%) (14). But it is higher than Hagen study done in Oslo, Norway when the neonatal mortality rate relative to admissions decrease significantly from 1987-1988 to 1997-1998 (6.9% vs. 3.4%) (15). In previous study in Baghdad –Iraq(Frankul 2003),there were 1120 neonatal deaths(31.3%) out of 3580 deaths in children below 14 years in the period from Jan. 1995- Dec. 1999. (16) These results may be due to the lack of well trained nursing staff and also lack of antibiotics, surfactant ideal respiratory support and other facilities for management of neonates specially premature babies in our SCBU. The sex differences were evident by higher percentage of death among males (64.7%) than females (35.3%).These results agreed with Frankul study (64.9% vs. 35.1%).This may be due to the fact that male neonates have approximately two folds higher incidence of sepsis and respiratory distress syndrome than females (16,17).The mortality rate for neonates varied significantly from hospital to hospital, but congenital malformations, neonatal infections and prematurity remain the major causes of death during the first 28 days of life (8, 18). This study showed that there was a significant increase in the percentage of death from congenital malformations (41.8%),it agrees with Hagen study where the congenital malformations was the leading cause of death(54%)(15), but it disagree with Frankul study(16)2003 (27.6%)and Awqati study(10) 2009 (10.3%), probably they studied larger sample of neonates in different parts of Iraq with lower standards of neonatal care. Neonatal sepsis is a major cause of morbidity and mortality in developing countries .(5.8,9,19) This study showed that sepsis was responsible for 187(83.8%) of all neonatal infections 223(33.4%) which is higher than Frankul study(16) (32.5%), and Al-Zwaini study (2002), when the incidence of neonatal septicemia for babies born at that hospital was 9.2 per 1000 live births , and mortality was (28%), probably because they studied all neonates born in that hospital of all gestational ages and birth weights, while we studied only referred neonates . (19) The prematurity constituted (10.3%) of neonatal deaths, which was less than Frankul study (15.5%).(16) According to birth weight, this study showed that the neonatal death rate was increased as birth weight decreased, and expected that the prematurity and low birth weight form higher percentage of deaths in neonatal care units (8,10,20). This study concluded that there was no decline in the neonatal death rate in our hospital in comparison with previous study especially from sepsis and prematurity and low birth weight. Death due to late onset sepsis was lower than that due to early onset sepsis .There was a significant increase in the death from congenital malformations.

References:

1. Laskar MS, Harada N: Trends and regional variations in infant mortality rates in Japan (1973-1998). Japan public health Journal. 2005 Jul.; 119 (7): 659-663.

2. Statistics and other data. Vital statistics division, Ministry of Health, Labor and Welfare of Japan, July 2005:659-663.http://www1. Mhlw.go.jp/English/index.ht ml.

3. Centers for Disease Control and Prevention CDC, Racial/ethnic disparities in neonatal mortality - united states,1989-2001.MMWR-Morb-Mortal-Wkly-Rep-2004 Jul 30; 53 (29): 655-8.

4. Andajani - Sutjahjo S, Manderson L: Still birth, neonatal death and reproductive rights in Indonesia. Reprod-Health-Matters. 2004 Nov.; 12 (24): 181-8.

5. Alistair G.S. Philip: Neonatal and Perinatal Mortality: A practical Guide of Neonatology, 4th edition, W.B. Saunders company, Philadelphia, 1996: 257-263.

6. Gomella TL, Cunningham MD, Eyle FG, Karin EZ : Death of an infant, in Lange clinical manual neonatology,5th ed., McGraw-Hill companies, USA, 2004. Chapter 63: 230-232.

7. Puopolo K.M: Bacterial and Fungal infections: in. Cloherty JP, Eichenwald EC, Stark AR (editors), manual of neonatal care, fifth edition, Lippincott Williams and Wilkins, 2004; 287-313.

8. Sule SS, Onayade AA. Community-based antenatal and perinatal interventions and newborn survival . Niger J Med. 2006 Apr-Jun;15(2):108-14.

9. Paul VK. The current state of newborn health in low income countries and the way forward. Semin Fetal Neonatal Med. 2006 Feb;11(1):7-14.

10. Awqati NA, Ali MM, Al-Ward NJ, Majeed FA, Salman K, Al-Alak M, et al. Causes and differential of childhood mortality in Iraq. BMC Pediatr. 2009 Jun 22;9(1):40.

11. Arafa MA, Alshehri MA: Predictors of neonatal mortality in the intensive care unit in Abha, Saudi Arabia. Saudi-Med-J.2003 Dec.; 24(12): 1374-6.

12. Klingenberg C, Olomi R, Oneko M, Sam N, Langeland N. Neonatal morbidity and mortality in Tanzania tertiary care referral hospital. Ann –Trop paediatr. 2003 Dec.; 23 (4): 293-9.

13. Rayco-Solon P, Moore SE, Fulford AJ, Prentice AM: Fifty year Mortality trends in three rural African villages. MRC Keneba, Banjul, The Gambia. Pura, Solon@ Ishtm.ac uk. 2004 IS: 1360-2276.

14. Anonymous: Morbidity and Mortality among outborn neonates at 10 tertiary care institutions in India during the year 2000. J-Trop –pediatr. 2004 Jun; 50 (3): 170-4.

15. Hagen CM, Hansen TW: Deaths in a Neonatal Intensive Care Unit: a 10-years perspective. Pediatr – Crit- Care – Med. 2004; Sep. 5(5): 463-8.

16. Frankul FM, Al-Hadad SA, Al-Kazraji MA .Children Mortality Rate and Causes of Death in Al-Mansour Teaching Hospital. Iraqi Post Graduate Medical Journal (IPMJ) April 2003; 2(3): 234-238.

17. Stoll BJ. Infection of neonatal infant. In: Kliegman RM, Behrman RE, Jenson HB, Stanton BF(Editors), Nelson Textbook of pediatrics, 18th edition, Chapter 109, 2007,Saunders – Elsevier, Philadelphia: 794-811.

18. Jeffrey D. Horbar Hospital and patient Characteristics Associated with Variation in 28 Day Mortality Rate for very low birth weight Infants. pediatrics, 1997; 99 (2): 149-156.

19. Al-Zwaini EJ ; Neonatal Septicemia in the neonatal Care unit, Al-Anbar governorate, Iraq. East-Mediterr – Health-J. 2002 Jul. Sep.; 8 (4-5): 509-14

20. Samir Mahmoud, Modebola A. Ajasin, Raphael S. Oruamabo: Birth weight-specific neonatal mortalities. Saudi Medical Journal 1998: 19 (4); 394-398.