Neonatal Mortality Rate in Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital in Missan Province From 2011 to 2014

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Abstract

Background: The neonatal mortality rate is a key outcome indicator for newborn care and directly reflects prenatal, natal, and postnatal care. Early neonatal deaths are more closely associated with pregnancy-related factors and maternal health, whereas late neonatal deaths are associated more with factors in the newborn‘s environment**.**

Objectives: To estimate the neonatal mortality rate in Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital in Missan Province during period (2011-2014). To determine the most common causes of death in the neonatal period.

Patients and methods: A hospital-based study was done depending on data collected from records of the Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital in Missan Province to calculate the number of deaths within the neonatal period (0-28 days) that was conducted from 2011 to 2014. The other line of data was collected from Obstetrical Ward by calculating number of live births for the same period. Then Neonatal Mortality Rate is calculated and conducted for each year according to the method recommended by WHO.

Results: The neonatal mortality rates were 12.15, 13.51, 16.37 and16.11 in 2011 to 2014 respectively in which there was an increment in mortality rate. The main causes of death were respiratory distress syndrome, birth asphyxia and congenital anomalies.

Conclusion: Neonatal mortality rate was high in the Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital, but it was less than the previous period in Iraq since 1990. These results suggest, that to decrease neonatal mortality, improved health service quality is crucial.

Keywords: Neonatal death, Neonatal intensive care unit, Infant mortality

Introduction

The Neonatal Mortality Rate (NMR) is defined as deaths of live born infants within the first 4weeks after birth per 1000 live births (Lissauer & Clayden, 2012). Live birth refers to the complete expulsion or extraction from the mother of a product of conception, irrespective of the duration of the pregnancy (WHO, 2006 & 2011). The neonatal period begins with birth and ends 28 complete days after birth (WHO, 2006). Moreover, may be further subdivided into the very early (birth to <24 hours), early (birth to <7 days), and late neonatal periods (7 days to <28 days) (Waldemar, 2015). The NMR is a key outcome indicator for newborn care and directly reflects prenatal, natal, and postnatal care (NMR, 2009). 130 million infants born each year worldwide, 4 million die in the first 28 days of life (WHO, 2005 & Lawn, et al., 2005). Three-quarters of neonatal deaths occur in the first week, and more than one-quarter occur in the first 24 hours (WHO, 2005). Neonatal deaths account for 40% (in 2000) of deaths under the age of 5 years worldwide (Lawn, et al., 2005 & Imtiaz, et al., 2009). Millennium Development Goal 4 (MDG4), regarding child survival, stipulates a reduction of two-thirds in children ages under 5 years, from 95 per 1000 in 1990 to 31 per 1000 in 2015 (WHO, 2015). However, the decline in neonatal mortality in 1990–2015 has been slower than that of post-neonatal under-five mortality: 47 percent, compared with 58 percent globally. This pattern applies to most low- and middle-income countries (UNICEF, 2016). In order to achieve the Millennium Development Goal target of a two-thirds reduction in under-five mortality from 1990 to 2015 (WHO, 2015) (equivalent to an average annual reduction of 4.4%, Shiffman, 2010), major reductions are going to be required in neonatal mortality (Lawn, et al., 2005). The last few years have seen a welcome acceleration in progress towards this goal, but less attention has been pay to neonates and less progress made compared to older children under the age of five. Hence, neonatal deaths represent an increasing proportion of global under-five deaths (Black, et al., 2010). Countries with the highest number of neonatal deaths, 2013 were, (HNN, 2013): 1-India 2-Nigeria 3-Pakistan 4-China 5-DR Congo 6-Ethiopia 7-Bangladesh 8-Indonesia 9-Angola 10-Kenya. Although there has been a substantial decline in the number of medically preventable deaths and deaths from respiratory distress syndrome, the number of deaths from extremely low birth weight (ELBW) has increased relative to other causes; asphyxia, birth trauma, early-onset sepsis and meconium aspiration syndrome have been reduced to a minimum (Avory & Fanaroff, 2011). The availability of neonatal intensive care has improved the outcomes of high-risk infants born either preterm or with serious medical or surgical conditions (Bode, et al., 2001). There was a dramatic reduction in neonatal mortality throughout the developed world that resulted from advances in management

of newborn infants together with improvements in maternal health and obstetric care (Lissauer & Clayden, 2012). From 2005 through 2011, the neonatal mortality rate declined 11% in United States (MacDorman, et al., 202013 & AAP, 2004).

Patients and Methods

A hospital-based study with analytic elements was done depending on data collected from records of the *Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital in Missan Province to calculate the number of deaths within the neonatal period (0-28 days) that was conducted from January/2011 to December/2014. The other line of data was collected from Obstetrical Ward to calculate the number of live births for the same period. The data was collected by using special formula including; the number of deaths in neonatal period, cause of death, gender, gestational age and total number of live births. Then Neonatal Mortality Rate (NMR) is calculated and conducted for each year according to the method recommended by WHO, 2006. Exclusion criteria; stillbirths were excluded. *Aseptic Neonatal Care Unit: is receiving and admitting newborns that delivered in Obstetrical Ward of Al-Sadder Teaching Hospital immediately after birth (day 0 of neonatal period).

Results and Discussion

The total live births in the Obstetrical Ward of Al-Sadder Teaching Hospital from 2011 through 2014 were 52836 while the total deaths in the Aseptic Neonatal Care Unit for the same period were 769. Total deaths per year in the neonatal period were increasing from 164 deaths (in 2011) to 219 deaths (in 2014) with corresponding an increment in mortality rate from 12.15(in 2011) to 16.37(in 2013) and mild decrement to 16.11(in 2014) as shown in table 1. The highest mortality rate was in 2013 (16.37) and the lowest rate was in 2011 (12.15). There was obvious an increment in mortality rate from 2011 to 2013 followed by slight decline in 2014. In classifying the causes of neonatal death, it was found that there were 6 causes mainly including RDS., birth asphyxia, congenital anomalies, meconium aspiration, neonatal sepsis and extremely low birth weight (ELBW). It was obvious that RDS was on top of these causes as shown in table 2. The present study found that in all years of the study; the male distribution was higher than female distribution in all the three main causes of death as shown in table 3. In studying the relation of gestational age and their effect as a risk factor with the commonest causes of death in neonatal period in 2011, it was found that preterm was significantly more than term infants. For birth asphyxia and congenital anomalies; preterm were less than term infants. In 2012, the difference between preterm and term infants

distribution in RDS was obviously significant and the opposite relation of gestational age for birth asphyxia and congenital anomalies in which term infants were more than preterm and it was highly significant statistically in all causes. In 2013, preterm distribution was more than term infants in RDS that was highly significant. In birth asphyxia, there was more predominance of term infants than preterm and with less predominance for congenital anomalies in which it was statistically of high significant for all causes. Regarding 2014, again preterm were more than term infants in RDS cause but there were big differences in birth asphyxia and congenital anomalies in which there were more prevalence of term infants than preterm that was statistically of high significant; P value is 0.0001 as shown in table 4.

Neonatal mortality has declined in all world regions since 1990 but that progress has been slowest in the regions with high NMRs such as Africa (Oestergaard, et al., 2011). The NMR in Iraq was of maximum value of 26.10 in 1990 and a minimum value of 18.70 in 2013 (WHO, 2016). World Neonatal mortality rate was 16.19 deaths per 1000 live births in 2009 (WHO, 2011) and in Iraq for the same year was 23 (Donald & Kenneth, 2008). The present study revealed that NMR was high in Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital in Missan province during period from 2011 to 2014, the NMR was increasing: (12.15, 13.51, 16.37 and 16.11 respectively) which would not meet MDG4. In Jordan and Bahrain, NMR results were the same in both countries, one in all four years (2011-2014). While in United Arab Emirates and Qatar, the NMR results were the same for both countries, four in all four years. When do comparison with these four countries; NMR in this study was obviously much higher than those countries. In Iran, NMR was 11 in both 2011 and 2012; there was mild decline in 2013 and 2014 reaching 10. In Turkey, NMR was nine in 2011 and 2012 decreasing to eight in 2013 and 2014 (WHO, 2016). Therefore, the current study's results are still higher than those nearby countries. On the other hand, there are many factors that may play a role in raising NMR in this study, these include: limited capacity of Al-Sadder Teaching Hospital's NCU which did not meet the admission number, deficiency in number of medical staff, lack of experienced, well trained team work, lack of mechanical ventilator and surfactant therapy and missing role of TPN (Total Parenteral Nutrition) which not achieving regionalized system of perinatal care. In studying the causes of death in the neonatal period, it was found that there are mainly three causes (including RDS, birth asphyxia and congenital anomalies) with fewer rates associated with meconium aspiration, neonatal sepsis and ELBW in all four years (2011-2014). Causes of death in the neonatal period in the developing world are poorly measured also, though major components are believed to be birth asphyxia, severe infections, complications of prematurity and tetanus (Lawn, et al., 2005). Many studies had revealed nearly the same

results regarding the main direct causes of neonatal death in which it were estimated to be preterm birth (28%), severe infections (26%), and asphyxia (23%) (Imtiaz, et al., 2009 & Bhutta, 2004). These results were consistent with WHO reports on the causes of neonatal death in developing countries (Lwan, et al., 2005). Therefore, when comparing percentages of RDS in this study (51%, 40%, 49% and 48% from 2011 to 2014 respectively) and birth asphyxia (27%, 31%, 28% and 23% from 2011 to 2014 respectively) with the previous results, it was higher in Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital. This means that we need to concentrate more on prevention of preterm delivery with more attention toward improvement of neonatal care. The present study found that neonatal infection were 1%, 5%, 1% and 0% from 2011 to 2014 respectively. The results were lower than the global rate of 26% [21] but this may be explained by that this study was calculating the neonatal deaths in Aseptic NCU in which there is less risk of neonatal sepsis. On the other hand, congenital anomalies was forming the third cause in Al-Sadder Teaching Hospital's NCU with high rate (19%, 17%, 13% and 16% from 2011 to 2014 respectively) and it is higher than the results of Imtiaz (a study in urban Pakistan 2009) in which it was forming 8% of neonatal deaths. Since causes of neonatal death vary by country and with the availability and quality of health care, understanding neonatal mortality in relation to these factors is crucial (Lwan, et al., 2005). Finally, some risk factors were analyzed in this study to see if there is any relation with the commonest three causes of early neonatal deaths from 2011 to 2014; these include gender and gestational age. RDS occurs primarily in premature infants; its incidence is inversely related to gestational age and birth weight. It is highest in preterm male infants (Waldemar & Ambalavanan, 2015). Preterm births are common and associated with significantly increased neonatal mortality and morbidity compared with births at 39 weeks (Donald & Kenneth, 2008). Regarding gender distribution, it was obvious that there were more male predominance than female in all the three causes and more significant in RDS cause for all years but statistically, it was of no significant. While there were significant predominance of preterm in RDS in all years and the opposite relation of gestational age with birth, asphyxia and congenital anomalies in which term infants were more than preterm.

Table 1. Live births, deaths in the neonatal period and NMR in each year.

year	Live births/ year	Deaths in the neonatal period/year	NMR
2011	13495	164	12.15
2012	12501	169	13.51
2013	13253	217	16.37
2014	13587	219	16.11
Total	52836	769	

Table 2. Causes of death in neonatal period and their numbers (percent) in each year.

Year	RDS. No. (%)	Birth asphyxia No. (%)	Congenital anomalies No. (%)	Meconium aspiration No. (%)	Neonatal sepsis No. (%)	ELBW. No. (%)
2011	83 (51%)	45 (27%)	31 (19%)	4 (2%)	1 (1%)	0 (0%)
2012	68 (40%)	53 (32%)	29 (17%)	7 (4%)	9 (5%)	3 (2%)
2013	106 (49%)	60 (28%)	29 (13%)	1 (1%)	3 (1%)	18 (8%)
2014	105 (48%)	50 (23%)	35 (16%)	5 (2%)	0 (0%)	24 (11%)

Table 3. Relation of gender with the commonest causes of neonatal death in each year of study.

Year	2011			2012			2013			2014		
Cause / Gender	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies
Male	55	23	16	40	35	16	63	39	19	62	35	19
Female	28	22	15	28	18	13	43	21	10	43	15	16
Total	83	45	31	68	53	29	106	60	29	105	50	35
P value		0.15			0.5			0.6			0.28	

Table 4. Relation of gestational age with the commonest causes of neonatal death in each year of study.

Year	2011			2012			2013			2014		
Cause / Gestational age	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies	RDS	Birth asphyxia	Congenital anomalies
Preterm	80	11	12	67	9	11	90	14	10	91	7	7
Term	3	34	19	1	44	18	16	46	19	14	43	28
Total	83	45	31	68	53	29	106	60	29	105	50	35
P value	0.0001			0.0001			0.0001			0.0001		

Conclusion

Neonatal mortality rate was high in the Aseptic Neonatal Care Unit of Al-Sadder Teaching Hospital and the Millennium Development Goal for child survival cannot be met without substantial reductions in neonatal mortality. In classifying the commonest causes of death, it was found that respiratory distress syndrome was on the top of list followed by birth asphyxia and congenital anomalies. Therefore, efforts should be focused on establishment of neonatal intensive care units and units for the care of premature babies.

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