

Epidemiological pattern of RDS, the common cause of neonatal death in Missan, Iraq

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Background:

Respiratory distress syndrome is a major cause of neonatal mortality all over the world, targeted mainly the premature newborns, the incidence inversely related to gestational age. We studied the distribution of negative impacts of various maternal and fetal risk factors to assess the real situation in our NICU that assist future planning to improve and diminish neonatal deaths.

Material and method

This Study enrolled in the inborn NICU at Al-Sader teaching hospital, Missan Iraq. Data collected from NICU records of dead neonates with RDS in a four years period started from first of January 2012 to 31st of December 2015. Data including maternal age, type of delivery, term type, residency, and fetal risk factors including gender, birth weight, and gestational age. SPSS software was used for analysis of data.

Results:

RDS death rate of inborn NICU admission was 13.4%, the highest risk factors for RDS mortality was male gender, low birth weight, G.A between 28<32 weeks, Mothers ages between 20-30 years, preterm delivery (<37 weeks) with a ratio of preterm : term of (4.7:1), NVD, urban resident mothers.

Conclusion:

RDS death rate was high in Missan. Low birth weight, Gestational age, Mothers age, preterm delivery was the highest risk factors for RDS mortality.

Introduction

Respiratory distress syndrome (RDS) is one of the commonest global causes of death in neonatal periods in many NICU. The incidence assumed to be 1% of live births—a relatively conservative estimate—approximately 1.4 million neonates develop RDS every year across the globe (total live births 137 688 million per year). Respiratory distress syndrome or (Hyaline membrane disease) mostly affects premature newborns (<37 weeks of gestation) although it may occur in full term (40 weeks of gestation), the incidence is highest among preterm male. Multiple maternal risk factors increase the incidence of RDS including multiple pregnancies, cesarean delivery, gestational or non-gestational diabetes, stress, precipitous delivery, had previous sibling with RDS, as well as, fetal risk factors as low birthweight and short gestational period. [1] Surfactant deficiency (decreased production and secretion) is the primary cause of RDS. Surfactant found in fetal lung by 20 weeks of pregnancy, mature levels of pulmonary surfactant are present usually after 35 week of gestation. Surfactant synthesis depends in part on normal pH, temperature, and perfusion thus, Asphyxia, hypoxemia, and pulmonary ischemia, particularly in association with hypothermia, stress, hypovolemia, and hypotension, may suppress the synthesis. Signs of RDS usually appear within minutes of birth, or less often, few hours after delivery usually started with tachypnea, nasal flaring, very weak respiratory effort, grunting, intercostal and subcostal retractions, and cyanosis. If the baby not received urgent and appropriate treatment, apnea and respiratory failure may occur followed by death. Ominous signs necessitate urgent intervention are irregular respirations and apnea. [1] Antenatal corticosteroids, post-natal oxygen therapy with Continuous positive airway pressure (CPAP) and Surfactant treatment, are the principles of RDS treatment in addition to supportive care, all dramatically improved the outcomes of infants with RDS [6]

Material and method:

A descriptive cross sectional study with analyzed element conducted in Neonatal Care Unit of Al-Sadder Teaching Hospital in Misan Province throughout a four years period started from first of January 2012 to 31st of December 2015. The data was collected from hospital records of neonatal care unit. It included riskfactors for RDS death and it is distribution including maternal factors like age, type of delivery, term type, residency, and fetal risk factors like gender, birth weight, and gestational age.

The study protocol was reviewed; approval and official permission were obtained from the Ministry of Higher Education, Misan directorate of health and Al-Sadder Teaching Hospital to conduct the present study. The analysis of data was carried out using the available Statistical Packages for Social Science, version 20.0 (SPSS-20.0). Data were presented in form of table of number and percentage with some figures.

Chi-square test was used for testing the significance of association between variables under study. Statistical significance was considered whenever the P-value was equal or less than 0.05.

RESULTS:

Neonates admitted to the NICU throughout the studied years (2012-2015) were 3573, the highest admission was in 2012 (1354) while in following years (2013, 2014, and 2015) admission was nearly approximated (706, 786, 727) respectively. The highest total NICU death rate was in 2015 (33.8%), followed by 2013 (30%), then 2014 (28%) while 2012 was the least (13.62%). Moreover, regarding specific RDS death, the highest rate found in 2015 (22.8%), $n = 166/727$, while in 2013 (16.3%), $n = 115/706$, in 2014 (15.8%) $n = 124/786$ and the least was in 2012 (5.02%). $n = 68/1354$. Other causes of deaths (non-RDS) were less common than RDS in all studied years except in 2012, the opposite occur, non-RDS death was (8.6%), which is higher than RDS death (5.02%) Shown in table 1

year	neonatal deaths in NICU/cause specific death						
	Numbers of	RDS deaths		*Other causes deaths		Overall deaths	
		No.	%	No.	%	No.	%

	admitted						
2012	1354	68	5.02	116	8.6	184	13.62
2013	706	115	16.3	97	13.7	212	30
2014	786	124	15.8	96	12.2	220	28
2015	727	166	22.8	80	11	246	33.8
Total	3573	473	13.2	389	10.8	862	24

Table 1: Numbers of admitted cases to NICU, no and % of deaths

*Other causes of death: Birth asphyxia, Congenital Anomalies, Meconium aspiration, Immaturity, Abortion and sepsis

RDS death trend:

RDS death rate increased progressively 4.5 folds from 2012 to 2015 (5.02%, 22.8%) respectively. Shown in fig 1

Regarding non-RDS deaths, the rate was higher than RDS deaths in 2012 only (8.6%, 5.02%) then started to decrease gradually from 13.7% in 2013 to 12.2% in 2014 and lastly to 11% in 2015. shown in fig 1.

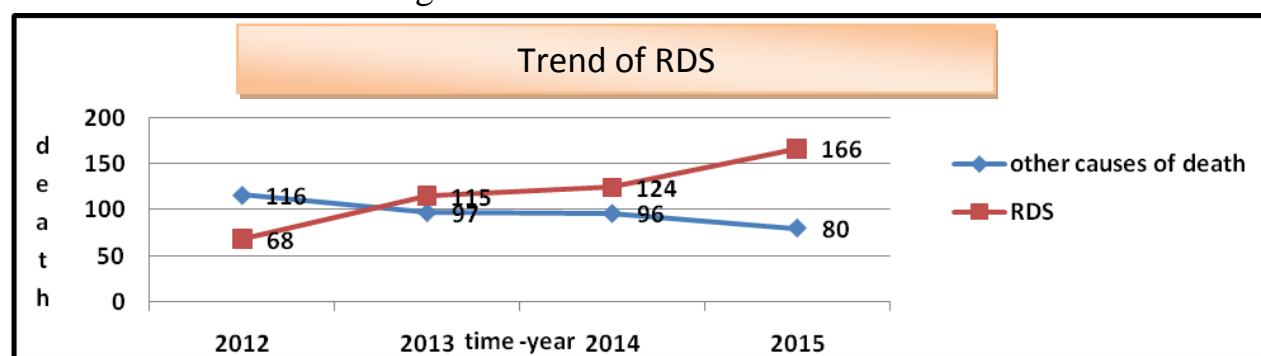


Figure 1: trend of RDS

NICU deaths:

Total NICU mortality rate was 24.12%, RDS death constitute 13.24% (473/3573) that represents 55% of all neonatal death, while non-RDS death 10.88 % (389/3573) represents 45% of neonatal deaths. The ratio of (RDS: non-RDS) deaths was 1.2:1. Shown in fig 2

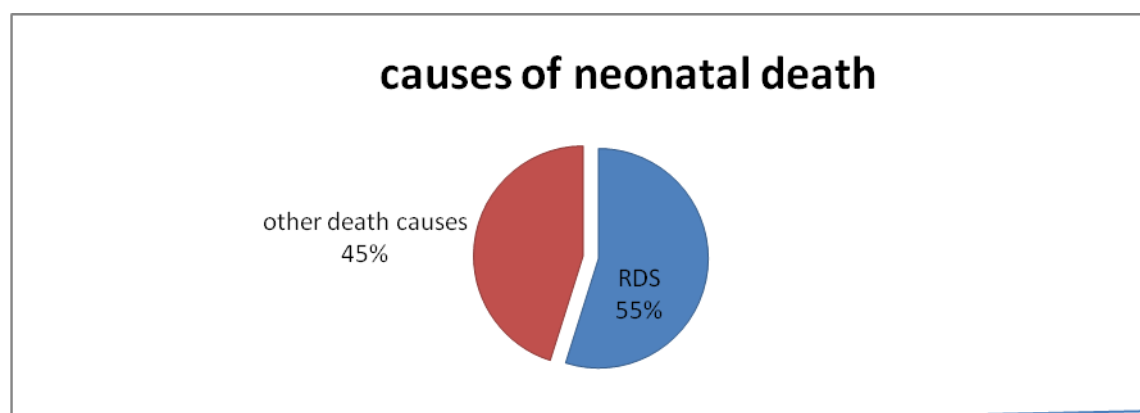


Figure 2: RDS and other death causes

Neonatal characteristics and distribution of RDS:

280 / 473 neonatal RDS death was male gender (59.2%), while female gender 193/473 constitutes only (40.8%) with a male: female ratio of 1.45:1.

(87.3%) of RDS death 413 / 473 were low birth weight , on the other hand, only (12.7%) 60/473 were of normal birth weight .with a ratio of (low: normal) birth weight of 7:1.

Table 2: Neonatal characteristics distribution.

		Freq.	%
gender	male	280	59.2
	female	193	40.8
	Total	473	100
Birth weight	normal body weight>1.500gm	60	12.7
	low body weight< 1.500 gm	413	87.3
	Total	473	100.
Term type	Late preterm(48 <37 weeks) and term newborns ≥37weeks	83	17.5
	Moderate preterm (32- <34) weeks.	110	23.3
	Very preterm (28-<32)weeks	222	46.9
	Extremity preterm(<28 weeks)	58	12.3
	Total	473	100

Regarding maternal charecrestic relation with RDS deaths:

Mothers ages between 20-30 years had the higher incidence of neonatal RDS death total n= 259 (54.8%) followed by maternal ages >30 years n=148 (31.3%) and lastly maternal age of <20 years neonatal n= 66 (14%). Shown in table3.

Furthermore, neonatal RDS mortality was higher in preterm infant 390/473(82.5%) while term neonate was 83/473 (17.5%), with a(preterm: term) ratio of (4.7:1) shown in table 3. **On the other hand**, DRS newborns of normal vaginal delivery (NVD) carried higher rate of death than those delivered by caesarean section(C/S), 375(79.3%), 98(20.7%) respectively. shown in table3.

In addition, neonatal RDS death was higher among urban resident mothers than rural residency 396(83.7%), 77(16.3%) respectively. with (urban: rural) residency ratio of 5.14:1 as shown in table3.

Table 3:Maternal characteristics distribution.

		Freq.	%
Mother age	less than 20	66	14.0
	20-30 year	259	54.8
	more than 30	148	31.3
	Total	473	100
Gestationa l age	term	83	17.5
	preterm	390	82.5
	Total	473	100
Type of delivery	NVD	375	79.3
	c/s	98	20.7
	Total	473	100
residency	urban	396	83.7
	rural	77	16.3
	Total	473	100

DISCUSSION:

In our study, the NICU admissions declined nearly 50% between 2012 and 2015 (1354,727) respectively, That disagreed by Harrison study in which NICU admissions had increased obviously from 2001 to 2012[1] and with Raid study in which significant

increase in NICU admission in the last few years had occurred [2]. our study reduction in neonatal admission may be attributed to quality improvement of antenatal care throughout this period and probably to safe hospital delivery that decreases many preventable causes of admissions such as birth asphyxia, abnormal presentation, hypoxia, meconium aspiration syndrome through appropriate and urgent intervention or application of emergent cesarean section. This agreed by Wilson study, in which Infants with adequate prenatal care had low NICU admission rate [3]. In our study, RDS mortality represents 13.24% of all NICU deaths that is lower than 24% in an Italian study [4]. Our neonatal RDS deaths increased progressively throughout studied years 2012 -2015 from (5.02% to 22.8%) with a four folds rising rate, this trend of increasing RDS mortality is multifactorial attributed to external and internal factors. One of external factors is the great deficiency of specific medication for RDS (surfactant therapy) which is very expensive drug, moreover, equipment deficiencies especially positive C.P.A.P ventilators, and deficient training courses both for medical and paramedical staff, all because of Iraqi recent financial collapse, which causes massive reduction in health Padget for ministry of health in the recent past few years because of the ongoing war against terrorism and ISIS. RDS constitute the higher percentage of NICU deaths (55%) that agreed with Raid study although with a different percentage 62% [2], male gender carried high risk for RDS death (59.2%) in agreement with many studies [2, 3]. Moreover, (87.3%) of RDS deaths were of low birth weight <2.5 kgs, probably related to high incidence of prematurity, agreed with many studies [1, 2, 3, 4]. On the other hand, only (12.7%) of RDS deaths were > 2.5 kgs., mostly, late preterm (34<36 weeks) or near term (36<37), whom at low risk for RDS, that agreed with many studies [4, 5, 6]. Moreover, RDS death correlates inversely to advance gestation, as the highest rate 46.9% was in very preterm(28<32 weeks) followed by 23.3% in moderate preterm (32<34 weeks) then by 17.5% in both late preterm and term babies (34<37)(≥37-42)weeks respectively. On the other hand, the lowest RDS death rate 12.3% was in (<28 weeks) probably because they already scanty cases as hardly they can survive with multiple systems immaturity. This inverse correlation of RDS death with advanced gestational ages agreed with many studies [3, 5, 7, 8]. While disagreed by another study [4], which showed that all preterm, infants with gestational age ≤ 34 weeks are at approximately equal risk for RDS. The highest RDS neonatal death rate was for mothers of ages between (20-30)years (54.8%) probably because it is a highly reproductive years of women life, followed by >30 years (31.3%) and lastly in < 20

years (14%), that disagreed with a study in Sewed showed that maternal age ≥ 30 years is a risk factor for prematurity RDS, [9] and another in Singapore showed that maternal age < 20 years were significantly highest risk groups . [10] in Singapore as in IRAQ adolescent marriage is common due to many contributed factors as religious, cultural, financial, social and physiological factors, which is different from developed countries .

In our study, most RDS dead babies delivered by NVD (79.3%) probably due to high incidence of premature rupture membrane and early labor for different causes that ends with prematurity which causes RDS , in agreement with a study in United States showed that recently they had an increase in infant mortality due to an increase in the preterm birth rate and complications [11], and another study showed that preterm labor (NVD) was the most common cause (45%) for late preterm RDS [12] , while RDS deaths of C/S deliveries were only 20.7% , that disagreed with a German study in which for every eight newborns delivered by primary CS one more than expected with vaginal delivery is hospitalized.[13] this low rate of RDS death with C/S delivery in our study explained by the facts that most of CS was among term pregnancy whom had low risk for RDS, similar results were found in Baghdad and Tikrit studies [14,15], moreover, in Al-Sadder teaching hospital the rate of C/S delivery compared to NVD is much lower (20% ,80%) respectively, equal to a ratio of 1:4 which often related to social, economic and religious factors that explain lower incidence of RDS with C/S deliveries compared to NVD

Urban residency RDS deaths 396/473(83.7%) was higher than rural areas 77/473 (16.3%) that was disagreed by different studies as [16, 17, 18] in which rural areas had higher risk of RDS deaths. Our higher rate of urban residence neonatal death of RDS attributed to the fact that the mother delivered mainly at hospital in contrast to mothers of rural residence mostly delivered at home due to socioeconomic, cultural, educational causes in addition to the far distances from the maternity hospitals.

Conclusion:

RDS death rate was high at Al-Sadder teaching hospital, Missan, Iraq.

Male gender, low birth weight, G.A between 28<32 weeks, Mothers ages between 20-30 years, preterm delivery (< 37 weeks) was the highest risk factors for RDS mortality.

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