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Neonatal Respiratory Distress in Misan: Causes, Risk Factors, and Outcomes

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ABSTRACT

Background: Respiratory distress is considered one of the most frequent causes of admission in the neonatal unit. Additionally, it is the leading cause of neonatal morbidity and mortality. This study aimed to determine the incidence of neonatal respiratory distress and its causes, risk factors, and outcomes to have a baseline data about the magnitude of respiratory distress with a further step toward the development of the neonatal field.

Methods: This cross-sectional study was conducted in the neonatal care unit of Misan Hospital for Child and Maternity in Misan, Iraq, during one year. All the neonates who developed respiratory distress were included in this study according to the World Health Organization criteria.

Results: The total number of neonatal admission during the study period was 870 cases among whom 738 (84.8%) subjects developed respiratory distress. The fatality rate was 21%, and the majority of deaths were found in respiratory distress syndrome (RDS) (67.1%). The RDS, transient tachypnea, and birth asphyxia were the major causes of neonatal respiratory distress. Statistically, prematurity, type of delivery, and number of babies at the delivery time were significantly associated with respiratory distress development.

Conclusion: The incidence rate of neonatal respiratory distress was apparently high in Misan forming the most common cause of neonatal admission associated with a high mortality rate. Efforts toward preventing the causes and risk factors for neonatal respiratory distress, as well as, improving the efficacy of neonatal care unit are the significant challenges to improve the neonatal care and outcome.

Keywords: Misan, Neonatal care unit, Neonates, Preterm, Respiratory distress

Introduction

Respiratory distress is a clinical picture depending mainly on five signs and symptoms, including respiratory rate more than 60 breaths/min, nasal flaring, central cyanosis in the room air, retraction, and grunting. This definition was according to the Swiss Society of Neonatology in 1972, and it is still applicable until now. So, the presence of at least two of these clinical criteria would postulate respiratory distress regardless of its etiology (1). The World Health Organization (WHO) has released a similar definition also depending on the clinical examination by the presence of respiratory rate >60 or <30 breaths/min, chest retraction, grunting on expiration, central cyanosis, or apnoea (2).

Respiratory distress is considered as an essential problem and one of the most prevalent causes of admission in the neonatal unit for both preterm and term babies (3, 4). It accounts for 7% of deliveries (5). The causes of neonatal respiratory distress can be classified into two categories, including respiratory and non-respiratory causes. It is noteworthy to state that respiratory causes form the majority of neonatal respiratory distress in which transient tachypnea of newborn (TTN), respiratory distress syndrome (RDS), and meconium aspiration syndrome (MAS) are the most frequent causes (6).

In the last decades, the primary goals have been directed toward decreasing the rate of respiratory distress, as well as morbidity and mortality caused by respiratory distress, by introducing different interventions, such as sophisticated models of mechanical ventilators, nasal continuous positive airway pressure (CPAP) (7), use of the antenatal steroids (8), and surfactant (9). A dramatic change

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in the morbidity and decline in the mortality were demonstrated in different studies by applying these interventions (7-9).

Lately, the American Academy of Pediatrics has introduced a new classification of neonatal care levels that is composed of basic care, specialty care, and subspecialty intensive care levels (10) reflecting the overall evidence of the appropriate care by the presence of proper personnel, equipment, physical space, and organization (11). Actually, the majority of Iraqi hospitals introduce inefficient respiratory support for a newborn with respiratory distress because of the restriction on the availability and use of the essential interventions, particularly the mechanical ventilation, nasal CPAP, and surfactant. In addition, until now there is a lack of trained personnel and no improvement toward applying this categorization of neonatal care levels (12).

Unfortunately, the same obstacles exist in Misan province (13). Although a new hospital for child and maternity has been established in May/2017 (in which this study was conducted), still this hospital has limited facilities and practices used in the neonatal stabilization resulted in suboptimal supportive care for neonates. For this reason, this study was conducted to collect baseline data about the magnitude of respiratory distress and determine its causes and mortality in Misan to take a step toward the development of the neonatal field.

Methods

A cross-sectional study was conducted in the Neonatal Care Unit of Misan Hospital for Child and Maternity in Misan province (located in the southeast of Iraq) during 1 year from the 1st of June 2017 to the 1st of June 2018. This new hospital was established in May/2017, and its Neonatal Care Unit consists of 20 incubators distributed in two significant halls with three bubbles CPAP and one conventional mechanical ventilator. Also, one observation room contains five warmers (i.e., resuscitators).

All the neonates who developed respiratory distress were included in this study regardless of the gender, gestational age, birth weight, mode of delivery, presence of congenital anomalies, and number of babies at the delivery time. Respiratory distress was determined according to the WHO definition depending on clinical examinations (2). Also, the gestational age was determined with the aid of the New Ballard Scoring System (14). The required data were collected from the patient's file, records of the Neonatal Care Unit, and records of the Obstetrical Unit. Causes of respiratory distress were diagnosed according to the history, clinical examination aided by other required investigations, and radiograph according to the clinical scenario.

Ethical considerations

The present study was performed based on the guidelines of the Declaration of Helsinki and approval of Ethical Committee of the College of Medicine in Misan University, Iraq. Data analysis was carried out using SPSS software (version 22). Data were presented in the form of tables and figures. Also, the Chi-square test (χ^2-test) was applied to meet the Cochran's criteria for testing the association between the different variables under the study (e.g., gestational age, gender, and type of delivery). Fisher's exact test was used for a variable that did not meet Cochran's criteria (i.e., the number of babies at the delivery time), and it was also applied in studying the association between each cause of neonatal respiratory distress and their outcomes.

Results

The total number of neonatal respiratory distress in each month was different, including the minimum number reported as 46 cases in June/2017 and the maximum number reported as 81 cases in July/2017. However, the total number per year was 738 cases. A similar variation was seen in both total admission in the neonatal care unit and the total live birth reaching a maximum number of 102 in July/2017 and 1134 in December/2017, respectively. Furthermore, the incidence rate of neonatal respiratory distress from the total admission in the neonatal care unit was 84.8% per year, while the incidence rate of neonatal respiratory distress from the total live birth was 6.7% per year as shown in Table 1.

Major causes of respiratory distress in newborns were RDS, TTN, and birth asphyxia reaching 40.9%, 33.1%, and 17.7%, respectively. Less common causes were pneumothorax and pneumonia with sepsis reported as 0.3% and 1.6%, respectively, as shown in Table 2. In studying the relationship between the causes of neonatal respiratory distress and different risk factors, it was found that the number of preterm babies was higher in RDS (86%) from total preterm cases, whereas the numbers of term

Table 1. Neonatal respiratory distress in relation to the total admission in the neonatal care unit and to the total live birth per month

Month/Year	Neonatal respiratory distress	Total admission in the neonatal care unit	Percentage of respiratory distress from total admission	Total live birth	Percentage of respiratory distress from total live birth
June/2017	46	65	70.8%	916	5.0%
July/2017	81	102	79.4%	962	8.4%
August/2017	63	73	86.3%	907	7.0%
September/2017	55	67	82.1%	942	5.8%
October/2017	53	64	82.8%	1021	5.2%
November/2107	58	68	85.3%	959	6.1%
December/2017	71	81	87.7%	1134	6.3%
January/2018	53	60	88.3%	998	5.3%
February/2018	50	54	92.6%	862	5.8%
March/2018	65	71	91.6%	860	7.6%
April/2018	63	77	81.8%	681	9.3%
May/2018	80	88	90.9%	827	9.7%
Total	738	870	84.8%	11069	6.7%

Table 2. Causes of respiratory distress in the neonatal period

Cause	Total number per year	(%)
Respiratory distress syndrome	302	40.9%
Transient tachypnea	244	33.1%
Birth asphyxia	131	17.7%
Congenital anomalies	28	3.8%
Meconium aspiration	19	2.6%
Pneumonia and sepsis	12	1.6%
Pneumothorax	2	0.3%
Total	738	100%

Table 3. Relationship between the causes of neonatal respiratory distress and different risk factors

Risk factors	Total number per year							
	Respiratory Distress syndrome	Transient tachypnea	Birth asphyxia	Congenital anomalies	Meconium aspiration	Others #	Total	P-value
Gestational age:								
Preterm	283 (86.0%)	19 (5.8%)	9 (2.7%)	9 (2.7%)	2 (0.6%)	7 (2.2%)	329 (100%)	
Term	19 (4.7%)	225 (55.0%)	122 (29.8%)	19 (4.7%)	17 (4.1%)	7 (1.7%)	409 (100%)	0.001*
Gender:								
Male	178 (37.8%)	166 (35.2%)	89 (18.9%)	16 (3.4%)	12 (2.6%)	10 (2.1%)	471 (100%)	
Female	124 (46.5%)	78 (29.2%)	42 (15.7%)	12 (4.5%)	7 (2.6%)	4 (1.5%)	267 (100%)	0.23 *
Type of delivery:								
Vaginal delivery	142 (42.7%)	66 (19.8%)	93 (27.9%)	7 (2.1%)	13 (3.9%)	12 (3.6%)	333(100%)	
Cesarean section	160 (39.5%)	178 (43.9%)	38 (9.4%)	21 (5.2%)	6 (1.5%)	2 (0.5%)	405 (100%)	0.001*
Number of babies At delivery time:								
Singleton	238 (36.4%)	231 (35.4%)	126 (19.3%)	28 (4.3%)	19 (2.9%)	11 (1.7%)	653 (100%)	
Multiple	64 (75.3%)	13 (15.3%)	5 (5.9%)	0 (0.0%)	0 (0.0%)	3 (3.5%)	85 (100%)	0.001**

Pneumonia with sepsis and pneumothorax causes
*Chi-square test
**Fisher's exact test

babies were mainly higher in TTN (55%) and birth asphyxia (29.8%) from total term cases. Statistically, there was a highly significant association between the gestational age and different causes of respiratory distress (P=0.001). It is worth mentioning that males overcome the females in all causes of respiratory distress, but statistically, there was no significance in this regard (P=0.23).

Regarding the mode of delivery, the majority of vaginal deliveries were found in cases with RDS (42.7%) and birth asphyxia (27.9%), while the majority of cesarean deliveries were seen in subjects with TTN (43.9%) followed by RDS (39.5%). In addition, the number of cesarean deliveries was higher than vaginal births. Statistically, there was a significant relationship between the types of delivery and different causes of neonatal respiratory distress. Finally, the number of singleton and multiple babies with RDS was higher reported as 36.4% and 75.3%, respectively. There was a significant relationship between the numbers of babies at the delivery time with each cause of neonatal respiratory distress (P=0.001) as shown in Table 3. About three-quarters of neonatal respiratory distress

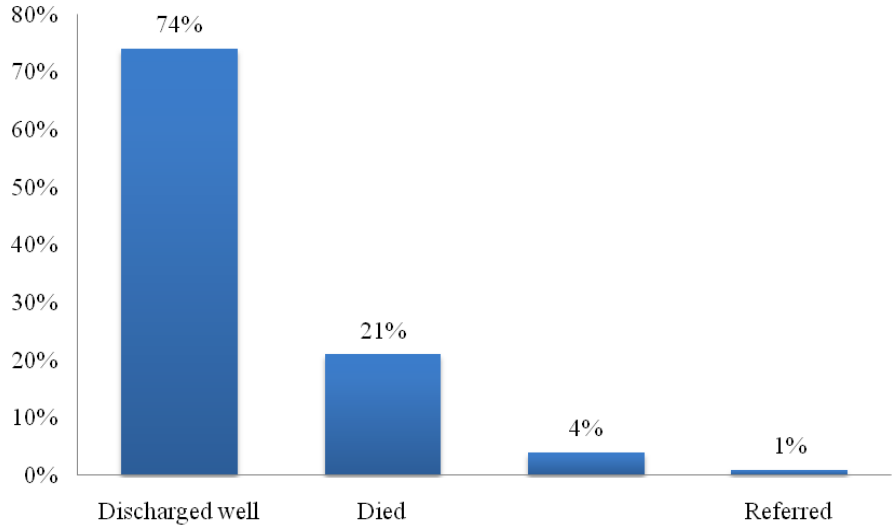

Figure 1. Total outcome of neonatal respiratory distress

Table 4. Outcomes of neonatal respiratory distress according to each cause

Cause	Well discharged	Left hospital despite medical advice	Referred	Died	P-value
Respiratory distress syndrome	192 (35.2%)	7 (21.9%)	1 (12.5%)	102 (67.1%)	0.001*
Transient tachypnea	230 (42.1%)	14(43.8%)	0 (0.0%)	0 (0.0%)	
Birth asphyxia	94 (17.2%)	9 (28.1%)	0 (0.0%)	28 (18.4%)	
Congenital anomalies	11 (2.0%)	0 (0.0%)	7 (87.5%)	10 (6.6%)	
Meconium aspiration	12 (2.2%)	2 (6.2%)	0 (0.0%)	5 (3.3%)	
Pneumonia with sepsis	5 (0.9%)	0 (0.0%)	0 (0.0%)	7 (4.6%)	
Pneumothorax	2 (0.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Total	546 (100%)	32 (100%)	8 (100%)	152 (100%)	

*Fisher's exact test

cases were well discharged, and 21% of the subjects died, whereas the remaining 4% and 1% left the hospital inspite of the medical advice and referred to another hospital, respectively, as shown in Figure 1.

Furthermore, the outcomes of neonatal respiratory distress were determined according to each cause. In this regard, the majority of deaths were found in cases with RDS (67.1%) followed by birth asphyxia (18.4%), while the majority of cases that were well discharged and left the hospital inspite of the medical advice were seen with TTN reported as 42.1% and 43.8%, respectively. No death was recorded with TTN, as well as pneumothorax. Additionally, there was a significant association between the outcomes and different causes of neonatal respiratory distress (P=0.001) as shown in Table (4).

Discussion

Respiratory distress is the leading cause of neonatal morbidity mainly when associated with preterm babies (15, 16), and an important leading cause of neonatal mortality (16, 17). In the present study, there was an apparent high rate of neonatal admission because of respiratory distress problems with different percentages each month ranging from 70% to 92% with an average rate of 84.8% per year. In comparing the annual rate of neonatal respiratory distress from the total admission in this study, it was found that Misan rate was higher than the rates of Saudi Arabia (78.5%) (18) and Turkey (Istanbul) (61.5%) (19). Also, the rate was much higher than that of Cameroon (47.5%) (16) and Switzerland rate in 2004 (52.8%) (15). Moreover, the rate of neonatal respiratory distress from the total live birth in this study was approximately double as the rate of Switzerland (3.8%) (15) and higher than the rate of Sudan (4.83%) (20).

The results of the current study showed that there were different causes found with an essential role in the neonatal respiratory distress, but principally, the most common reasons were RDS and TTN followed by birth asphyxia with the rates of 40.9%, 33.1%, and 17.7%, respectively. Different sequences (for the first three and most common causes) were found in Iran in which RDS, pneumonia, and TTN were the most frequent causes with different rates of 36.6%, 30.1%, and

%14, respectively (21). In addition, a similar finding was seen in a study conducted by Palod et al. in India 2017 with different rates of RDS (31.3%), pneumonia (28.1%), and TTN (16.7%) (22). However, Misan rates were higher than those of Iran, as well as India, for both RDS and TTN but much lower than pneumonia rates. On the contrary, Misan rate of RDS was lower than that of Saudi Arabia (54.7%) (18) and much higher than that of Switzerland (9.3%) (15).

It is worth mentioning that the first most common cause of neonatal respiratory distress in the current and other different studies was RDS (18, 21, 22). The results of our study are inconsistent with those of Sudan in which the most common cause was TTN (28%) followed by infection (24%) and RDS (15%) (20). In this study, birth asphyxia was the third cause with a high percentage (17.7%). It was higher than that of India (14.9%) (22) and much higher than that of Iran (1.1%), and birth asphyxia as the cause of respiratory distress was at the end of the list in comparison to that of Misan (21).

Apparently, the high rates of RDS, TTN, and birth asphyxia (40.9%, 33.1%, and 17.7% respectively) were noticed in our study) with different sequences in comparison to the findings of other different studies. Therefore, the concentration on the associated risk factors, such as preterm birth, antenatal care, caesarean deliveries, and delivery room management, is essential in predicting the neonatal respiratory distress and can explain the reason behind the high rate of these causes, as well as, the high rate of neonatal respiratory distress in Misan.

The results of the present study revealed a higher number of preterm newborns than term neonates in cases with RDS. Additionally, the majority of total preterm neonates (86%) had RDS, and these observations are consistent with those of Baghdad (the capital city of Iraq) (12), Saudi Arabia (18), Iran (Tehran) (23), and India (24). Statistically, there was a significant relationship between prematurity and subsequent development of RDS. Partially, this can explain that RDS was the first and major cause of neonatal respiratory distress in this study. Many studies with strong evidence had revealed a converse relationship between the gestational age and respiratory distress (3, 5, 22, 25).

In addition, the types of delivery, as well as the multiple pregnancies, in this study were found to be strongly associated with RDS with a high statistical significance (P=0.001). In this study, most of RDS cases were delivered by cesarean section in comparison to vaginal delivery, and this is in accordance with the observations in Baghdad (12) and Iran (Tehran) (23), as well as the findings of Levine et al. study, which detected more respiratory morbidity in neonates (4.5%) after cesarean section compared to that after the vaginal delivery (1.4%) (26). Additionally, the majority of the total multiple pregnancies (75.3%) were significantly associated with RDS by inducing a preterm delivery.

Therefore, these risk factors for gestational age, types of delivery, and multiple pregnancies played an essential role in the development of RDS in this study that is in line with the results obtained by Cameroon (16). However, the efforts toward decreasing the rate of prematurity and cesarean section with good antenatal care would reduce the rate of RDS resulting in further reduction and prevention of neonatal respiratory distress. These observations are consistent with those of another study (27). The TTN in this study occurred more commonly in term babies and cesarean deliveries in which the majority of total term babies (55%), as well as the majority of total cesarean section deliveries (43.9%), were significantly associated with TTN, and these findings are in agreement with those of another study in Baghdad (28) but with higher rates of 78% and 70%, respectively.

Different studies reported a highly significant association between TTN and cesarean section (especially the elective type) (3, 28, 29). The elective cesarean deliveries were considered as important risk factors for the development of respiratory distress in term neonates, particularly at the gestational age of 37-38 weeks (30). Moreover, some studies demonstrated a decline in the rate of TTN after the administration of antenatal steroid 48 h before an elective cesarean section (31). So, it is necessary to avoid performing an elective cesarean delivery before 38 weeks of gestation wherever possible. Furthermore, understanding and controlling these factors will reduce respiratory distress in term babies.

On the other hand, this study found that the birth asphyxia occurred more commonly in term babies and vaginal deliveries with high rates from the total term babies (29.8%) and total vaginal deliveries (27.9%). Statistically, this association was highly significant (P=0.001). These findings are similar to the results of other studies (3, 13). The results of this study revealed that among the different risk factors, gender was not significantly associated with any causes of respiratory distress in spite of having higher rates in male than female

groups. These findings are compatible with those of two studies in Iran (23, 28) and inconsistent with those of other studies, which showed a significant association between male gender and neonatal respiratory distress (21, 32, 33).

In this study, congenital anomalies were reported as 3.8% and were associated with a higher predominance level in single male term babies delivered by cesarean section. This needs further work to analyze associated risk factors causing congenital anomalies to be as the fourth cause of this rate. It is well known that the amniotic fluid is usually stained by meconium in about 10%-15% of deliveries, but MAS occurs in only 1% (34,35) of the cases. The MAS in this study occurred in 2.6% of the cases with neonatal respiratory distress and was mainly associated with single term newborns that were delivered vaginally. Statistically, there was a significant relationship between MAS and these factors. The current rate was lower than those of Baghdad (4%) (28), Sudan (6%) (20), Iran (7.5%) (21), and India (11%) (22).

It was found that a newborn with respiratory distress is 2-4 times at risk of death in comparison to a newborn without respiratory distress (3). Furthermore, the fatality rate due to neonatal respiratory distress was 21% in this study, which was higher than those of Iran (19.4%) (21) and India (Palodet al. study) (12.5%) (22) but lower than those of Saudi Arabia (36), Cameroon (16), and Sudan (20) (22.4%, 24.5%, and 36%, respectively). In Switzerland, great efforts were made in the neonatal intensive care unit in which the fatality rate from neonatal respiratory distress decreased significantly from 15.5% in 1974 to 3.5% in 2004 (15). As a result, this high fatality rate in Misan Hospital for Child and Maternity in comparison to these discordant data can be attributed to the differences in the standard levels of neonatal care, antenatal care, equipment, supportive intervention, and trained personnel.

The results of the current study showed that RDS caused the majority (67.1%) of total death in the neonatal respiratory distress, which was high. This rate was much higher in comparison to those of different studies in Switzerland (12%) (15), Saudi Arabia (36), Iran (27%) (21), India (33.3%) (22), and Sudan (34.3%) (20). On the other hand, birth asphyxia was the second cause of death in this study (18.4%), which was lower than that of India (25.7%) (22) and higher than that of Saudi Arabia (7.6%) (36). Surprisingly, congenital anomalies were the fourth common cause of neonatal respiratory distress with a high fatality rate (6.6%) being in the third sequence. It is required to perform further research on this issue.

The inefficient respiratory support can explain the high death rate caused by both RDS and birth asphyxia due to the limited capacity of CPAP (only three) and mechanical ventilator (only one), which were incompatible with the number of neonatal respiratory distress and restriction in the availability and use of the surfactant therapy. Additionally, deficiency in the number, as well as the experience of medical and nursing staff, missing the role of total parenteral nutrition (not available at all), and physical capacity were other contributing factors in determining the quality of neonatal care.

Finally, reducing the rate and fatality of neonatal respiratory distress in Misan was the main subsequent step behind this study that aimed to reduce the neonatal mortality rate and achieve the Millennium Development (37) Goal 4. So, understanding the neonatal respiratory distress in relation to its different risk factors, particularly prematurity and mode of delivery would require making more efforts toward the antenatal, natal, and postnatal periods through a synchronized teamwork concept involving the antenatal care, obstetric care, delivery room management, and neonatal care. The aforementioned items can change the neonatal outcomes in all Iraq, particularly in Misan.

Conclusion

The incidence of neonatal respiratory distress was high in the Neonatal Care Unit of Misan Hospital for Child and Maternity and was reported as the most common cause of neonatal admission associated with a high mortality rate. Efforts toward preventing the causes and risk factors for neonatal respiratory distress, as well as improving the efficacy of neonatal care unit, are the significant challenges to improve the neonatal care and outcome.

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Conflicts of interests

The authors report that there is no conflict of interest with any organization.

References

1. Baeckert P, Ackermann-Liebrich U, Duc G. Neonatal respiratory distress syndrome in Switzerland. Data for 1984 and comparison with 1974. Schweiz Med Wochenschr. 1987; 117(27-28):1021-7.
2. McCormick M, Cooper P. Managing newborn problems: a guide for doctors, nurses, and midwives. Geneva: World Health Organization; 2003.
3. Swarnkar K, Swarnkar M. Neonatal respiratory distress in early neonatal period and its outcome. Int J Biomed Adv Res. 2015;6(09):643-7.
4. Pramanik AK, Rangaswamy N, Gates T. Neonatal respiratory distress: a practical approach to its diagnosis and management. Pediatr Clin North Am. 2015; 62(2):453-69.
5. Edwards MO, Kotecha SJ, Kotecha S. Respiratory distress of the term newborn infant. Paediatr Respir Rev. 2013; 14(1):29-36.
6. Hermansen CL, Mahajan A. Newborn respiratory distress. Am Fam Physician. 2015; 92(11):994-1002.
7. John EB, Carlo WA. Respiratory distress syndrome in VLBW infants: changes in management and outcomes observed by the NICHD Neonatal Research Network. Semin Perinatol. 2003; 27(4):288-92.
8. Crowley P. Withdrawn: prophylactic corticosteroids for preterm birth. Cochrane Database Syst Rev. 2006; 3:CD000065.
9. Sinn JK, Ward MC, Henderson-Smart DJ. Developmental outcome of preterm infants after surfactant therapy: systematic review of randomized controlled trials. J Paediatr Child Health. 2002; 38(6):597-600.
10. American Academy of Pediatrics Committee on Fetus and Newborn. Levels neonatal care. Pediatrics. 2012; 130(3):587-97.
11. Oestergaard MZ, Inoue M, Yoshida S, Mahanani WR, Gore FM, Cousens S, et al. Neonatal mortality levels for 193 countries in 2009 with trends since 1990: a systematic analysis of progress, projections, and priorities. PLoS Med. 2011; 8(8):e1001080.
12. Hameed NN, Abdul Jaleel RK, Saugstad OD. The use of continuous positive airway pressure in preterm babies with respiratory distress syndrome: a report from Baghdad, Iraq. J Matern Neonatal Med. 2014; 27(6):629-32.
13. Ali EA. Neonatal mortality rate in aseptic neonatal care unit of Al-Sadder teaching hospital in missan province from 2011 to 2014. Eur Sci J. 2016; 12(27):55-62.
14. Ballard JL, Khoury JC, Wedig KL, Wang L, Eilers-Walsman BL, Lipp R. New Ballard Score, expanded to include extremely premature infants. J Pediatr. 1991; 119(3):417-23.
15. Ersch J, Roth-Kleiner M, Baeckert P, Bucher HU. Increasing incidence of respiratory distress in neonates. Acta Paediatr. 2007; 96(11):1577-81.
16. Tochie JN, Choukem SP, Langmia RN, Barla E, Koki-Ndombo P. Neonatal respiratory distress in a reference neonatal unit in Cameroon: An analysis of prevalence, predictors, etiologies and outcomes. Pan Afr Med J. 2016; 24:152.
17. Jasso-Gutiérrez L, Durán-Arenas L, Flores-Huerta S, Cortés-Gallo G. Recommendations to improve healthcare of neonates with respiratory insufficiency beneficiaries of Seguro Popular. Salud Publica Mex. 2012; 54:S57-64.
18. Qari SA, Alsufyani AA, Muathin SH, El Margoushy NM. Prevalence of respiratory distress syndrome in neonates. Egypt J Hosp Med. 2018; 70(1):257-64.
19. Fedakar A, Aydoğdu C. Clinical features of neonates treated in the intensive care unit for respiratory distress. Turk J Pediatr. 2011; 53(2):173-9.
20. Abdelrahman SM, Hamed SM, Nasr A. Neonatal respiratory distress in Omdurman Maternity Hospital, Sudan. Sudan J Paediatr. 2014; 14(1):65-70.
21. Sabzehei M, Basiri B, Shokouhi M, Fayyazi A. Causes and outcomes of respiratory distress in neonates hospitalized in the neonatal intensive care unit of Beâ sat hospital in Hamadan, Iran. Int J Pediatr. 2017; 5(12):6253-60.
22. Palod PH, Lawate BB, Sonar MN, Bajaj SP. A study of clinical profile of neonates with respiratory distress and predictors of their survival admitted in neonatal intensive care unit of tertiary care hospital. Int J Contemp Pediatr. 2017; 4(6):2027-31.
23. Saboute M, Kashaki M, Bordbar A, Khalessi N, Farahani Z. The incidence of respiratory distress syndrome among preterm infants admitted to neonatal intensive care unit: a retrospective study. Open J Pediatr. 2011; 5(4):285-9.
24. Santosh S, Kushal KK, Adarsha E. A clinical study of respiratory distress in newborn and its outcome. Indian J Neonatal Med Res. 2013; 1(1):2-4.
25. Hibbard JU, Wilkins I, Sun L, Gregory K, Haberman S, Hoffman M, et al. Respiratory morbidity in late preterm births. JAMA. 2010; 304(4):419.
26. Levine EM, Ghai V, Barton JJ, Strom CM. Mode of delivery and risk of respiratory diseases in newborns. Obstet Gynecol. 2001; 97(3):439-42.
27. American College of Obstetricians and Gynecologists; Society for Maternal-Fetal Medicine. Obstetric care consensus no. 1. safe prevention of the primary cesarean delivery. Obstet Gynecol. 2014; 123(3): 693-711.
28. Hameed NN, Al-janabi MK, Al-reda YI. Respiratory distress in full term newborns. Iraqi Postgraduate J. 2007; 6(3):233-9.
29. Ross MG, Beall MH. Cesarean section and transient tachypnea of the newborn. Am J Obstet Gynecol. 2006; 195(5):1496-7.
30. Gouyon JB, Ribakovsky C, Ferdynus C, Quantin C, Sagot P, Gouyon B, et al. Severe respiratory disorders in term neonates. Paediatr Perinat Epidemiol. 2008; 22(1):22-30.
31. Stutchfield P, Whitaker R, Russell I. Antenatal betamethasone and incidence of neonatal respiratory distress after elective caesarean section: pragmatic randomised trial. BMJ. 2005; 331(7518):662.
32. Chandrasekhar R, Mohan MM, Lakshmi BV. Clinical study of respiratory distress in newborn. Int J Contemp Pediatr. 2016; 10:2349-91.
33. Anadkat JS, Kuzniewicz MW, Chaudhari BP, Cole FS,

Hamvas A. Increased risk for respiratory distress among white, male, late preterm and term infants. J Perinatol. 2012; 32(10):780-5.
34. Oyelese Y, Culin A, Ananth CV, Kaminsky LM, Vintzileos A, Smulian JC. Meconium-stained amniotic fluid across gestation and neonatal acid-base status. Obstet Gynecol. 2006; 108(2):345-9.
35. Dargaville PA, Copnell B. The epidemiology of meconium aspiration syndrome: incidence, risk factors, therapies, and outcome. Pediatrics. 2006; 117(5):1712-21.
36. Arafa MA, Alshehri MA. Predictors of neonatal mortality in the intensive care unit in Abha, Saudi Arabia. Saudi Med J. 2003; 24(12):1374-6.
37. Assembly OG. Road map towards the implementation of the United Nations millennium declaration: report of the secretary-general. In: Road Map Towards The Implementation of The United Nations Millennium Declaration: Report of the Secretary-General, New York, United Nations; 2001.