Research Article

Risk of respiratory morbidity in elective cesarean delivery outcome infants at term

Saeed A Abdelgabar[1], Walid G Babikr[2], Amar B Elhussein[3], Moawia E Hummeida[4]

[1]Department of Obstetrics and Gynecology, College of Medicine, Najran University, Najran, Saudi Arabia.
[2]Department of Medicine, College of Medicine, Najran University, Najran, Saudi Arabia.
[3]Department of Biochemistry, College of Medicine, Najran University, Najran, Saudi Arabia.
[4]Department of Obstetrics and Gynecology, Alneelain University, Khartoum, Sudan.
Correspondence to: Amar B Elhussein, E-mail: ammarbab@yahoo.com

Received February 10, 2016. Accepted February 21, 2016

Abstract

Background: The incidence of elective cesarean delivery (ECD) at term is rapidly increasing in the last decades, which is significantly contributing to neonatal respiratory morbidity.

Objective: To study the risk of respiratory morbidity in neonates delivered by ECD at term.

Material and Methods: Descriptive prospective hospital-based study involving 511 women who delivered by ECD at term in Khartoum Teaching Hospital (KTH) and Omdurman Maternity Hospital (OMH). The cases of this study include all singleton neonates born to mothers delivered by ECD at (37–40 weeks) of gestation at OMH and KTH between April 1, 2010, and February 28, 2011. The study cases were neonates born to mothers delivered by ECD at 37–40 weeks' gestation. Cases were matched for gestational age, maternal age, parity, baby weight, and maternal body weight. Apgar score and examination of the neonates were carried out and recorded by the pediatric team.

Result: The majority of women recruited in this study delivered at 38–39 weeks' gestational age, and their ages were between 26 and 30 years. Results showed that most of the babies delivered with weight <2.5 kg had increased respiratory morbidity. Also, there were some differences in outcome regarding neonatal gender having respiratory morbidity; boys were found to be more affected than girls. Finally, the results showed that 7.2% of the delivered babies had respiratory problems.

Conclusion: Neonatal respiratory morbidity has been shown to be decreased with increasing gestational age and increasing neonatal weight in ECD at term.

Key Words: Apgar score, elective caesarean delivery (ECD), respiratory distress syndrome (RDS)

Introduction

The cesarean delivery (CD) rate in the United States has increased to 30.2% in 2005.[1] This can be attributed to many factors such as the increase in the rates of first time or primary CD and decrease in rates of vaginal birth after CD. The trend of adopting maternal request without any medical or obstetric reason as an indication for CD has also substantially increased the rate of elective cesarean delivery (ECD).[2] The management of previous CD and breech presentation were the main factors that have increased the rate of ECD in the Western countries in the past 20 years.[3]

Access this article online	
Website: http://www.ijmsph.com	Quick Response Code:
DOI: 10.5455/ijmsph.2016.10022016351	

The neonatal respiratory morbidities associated with the ECD at term include respiratory distress syndrome (RDS), severe hypoglycemia, transient tachypnea of the newborn (TTN), sepsis, and admissions to special care baby unit.[4] Previous studies have shown ECD to be associated with an increased risk of respiratory morbidity in neonates.[5] Vaginal delivery is linked with less neonatal respiratory morbidity compared to ECD, though the evidence is characterized by varying definitions and methodologies.[6,7]

It is plausible that physiological and hormonal changes that occur during labor are necessary for maturation of the lung in neonates and that these changes may not occur in infants delivered by ECD.[8,9] Gestational age (GA) at time of ECD may also be an important factor for respiratory morbidity in the neonates. Current clinical practice differs without close scrutiny, but the operation is most frequently performed at 38–39 weeks of pregnancy, due to the fact that respiratory morbidities are low. It has nonetheless been clearly demonstrated in different studies that CD increases the risk of TTN and RDS compared to vaginal births, even when it is performed electively at term.[10]

Since the actual determinants of the risk of RDS or TTN are ascertained by the mode of delivery and GA, the effect of the timing of ECD is receiving a growing attention.[11,9] There is evidence that planning and doing ECD at 39 or 40 weeks, rather than at 37 or 38 weeks, substantially reduces both overall respiratory morbidity and severe respiratory failure with its associated mortality risk.[12]

Materials and Methods

This is a descriptive, prospective hospital-based study conducted from April 2010 to February 2011. The study areas were Omdurman Maternity Hospital (OMH), locally known as ALDAYAT, which is a class A governmental hospital located in the center of Omdurman, and Khartoum Teaching Hospital (KTH), which is also a class A governmental hospital located in the center of Khartoum (the capital of Sudan).

The cases of this study include all singleton neonates born to mothers delivered by ECD at 37–40 weeks' of gestation at OMH and KTH between April 1, 2010, and February 28, 2011. The study cases were neonates born to mothers delivered by ECD at 37–40 weeks' gestation. Cases were matched for GA, maternal age, parity, baby weight, and maternal body weight.

Inclusion criteria: In this study, we included neonates delivered by ECD at 37–40 weeks' gestation.

Exclusion criteria: Outcomes of multiple pregnancies, neonates with congenital malformation, outcomes of pregnancies complicated by preeclampsia, IUGR, diabetes or oligohydramnios, placenta previa and other obstetric complications, and premature babies with wrong estimated GA were all excluded from this study.

Data Collection Technique

Data were collected by directly interviewing the mothers using a predesigned reviewed questionnaire. APGAR score and examination of the neonates were carried out and recorded by the pediatric team.

Data Analysis

A descriptive analysis was carried out using SPSS, version 21, for Windows.

Results

The study included 511 women who delivered by ECD at term (37–40 weeks) in KTH and OMH from April 2010 to February 2011 to determine the risk of respiratory morbidity in neonates delivered by ECD at term.

Newborns whose mothers' ages were between 21 and 30 years showed that the risk of respiratory morbidity was high (3.9%) whereas those whose ages were less than 20 years and more than 40 years were less affected (0.59% and 0.78%, respectively). It was found that babies of 7.2% of the studied population had respiratory problems [Table 1].

The babies of 2.9% of ladies who delivered (by ECD) at 37 weeks' GA had shown higher risk of respiratory morbidity compared to those delivered by ECD at 37 –38 weeks (2.3%) and 38–39 weeks (1.6%), whereas only (0.39%) outcome babies of women who had ECD at 39–40 weeks experienced respiratory morbidity [Table 2].

Our study results showed that 4.5% of babies delivered at 37 weeks scored less than 5 on Apgar at 5 min. It was observed that 1% of babies whom were delivered at 38–39 weeks scored less than 5 on Apgar. The results also showed that babies born to women with high GA had good Apgar score than those who were born to women with less GA [Table 3]. The results further showed that 23.1% of babies with respiratory morbidity belong to women who were either illiterate or had low education, compared to better outcome observed in the women with higher education [Figure 1].

Almost a quarter of the babies with weight <2.5 kg had respiratory morbidity. This decreased to 8% in babies whose weights were between 3.5 and 4.5 kg. However, newborns who weighed 2.5–3.5 kg exhibited 2.8% morbidity. None of the newborns weighing >4.5 kg were affected [Figure 2]. There was a little difference in the percentage of the males (8.2%) and females (6.4%) having respiratory morbidity [Figure 3]. The babies of 7.2 % of the studied population had respiratory problems [Figure 4].

Discussion

We found that maternal age above 40 was a real risk factor for the development of respiratory morbidity among neonates delivered by ECD at term. Higher GA was associated with lower chances of neonatal respiratory morbidity. The study also revealed that the higher the level of maternal education, the lower the chance that neonates will develop respiratory morbidity. Gender wise, our study showed that boys were more likely than girls to develop respiratory morbidity. The study revealed clearly that neonatal respiratory morbidity was in direct proportion to low birth weight.

In this study, the risk of respiratory morbidity among neonates delivered by ECD at term was higher in the age group above 40 years. The least age group to show respiratory

Table 1: Relationship between respiratory morbidity and maternal age

Valid		Respiratory morbidity		Total number	Total number of group (%)	Total number of study (%)
		No	Yes			
Age	<20 years	39	3	42	7.1	0.59
	21–30 years	226	20	246	8.1	3.9
	31–40 years	187	10	197	5.1	1.95
	>40 years	22	4	26	15.4	0.78
Total		**474**	**37**	**511**		**7.2**

Table 2: Relationship between respiratory morbidity and GA

Valid		Respiratory morbidity		Total number (%)	Total number of group (%)	Total number of study (%)
		No (%)	Yes (%)			
GA	37 weeks	29 (65.9)	15 (34.1)	44 (8.6)	(34.1)	(2.9)
	37–38 weeks	170 (93.4)	12 (6.6)	182 (35.6)	(6.6)	(2.3)
	38–39 weeks	194 (96)	8 (4)	202 (39.5)	(4)	(1.6)
	39–40 weeks	81 (97.6)	2 (2.4)	83 (16.2)	(2.4)	(0.39)
Total		**474 (92.8)**	**37 (7.2)**	**511 (100)**		(7.2)

GA, gestational age.

Table 3: Apgar score at 5 min related to GA

Valid		Apgar score at 5 min (%)			Total
		<5	5–7	7–10	
GA	37 weeks	2 (4.5)	8 (18.2)	34 (77.3)	44 (100)
	37–38 weeks	0 (0)	18 (9.9)	164 (90.1)	182 (100)
	38–39 weeks	2 (1)	24 (11.9)	176 (87.1)	202 (100)
	39–40 weeks	0 (0)	15 (18.1)	68 (81.9)	83 (100)
Total		**4 (8)**	**65 (12.7)**	**442 (86.5)**	**511 (100)**

GA, gestational age.

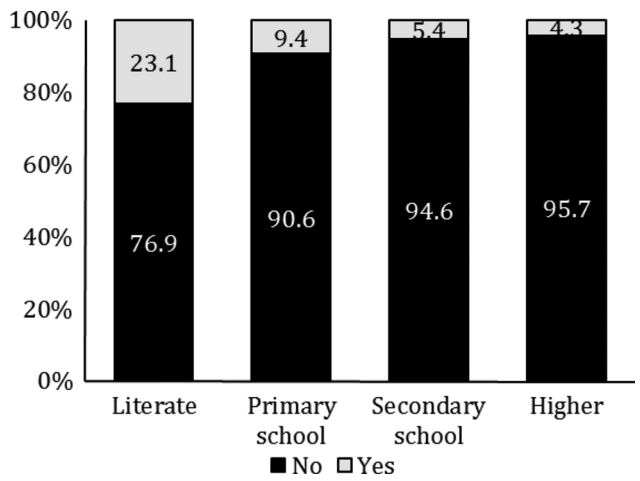

Figure 1: Relationship between respiratory morbidity and maternal education.

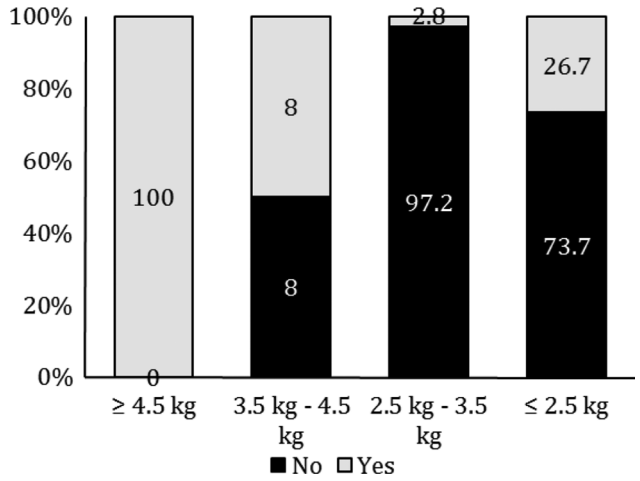

Figure 2: Relationship between respiratory morbidity and infant weight.

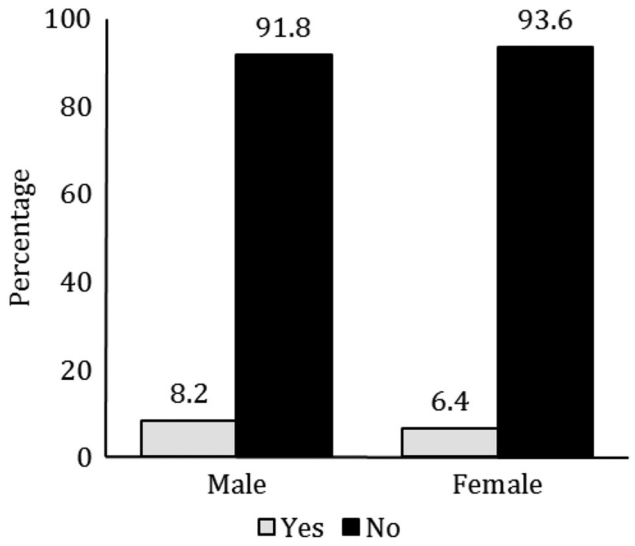

Figure 3: Relationship between respiratory morbidity and infant gender.

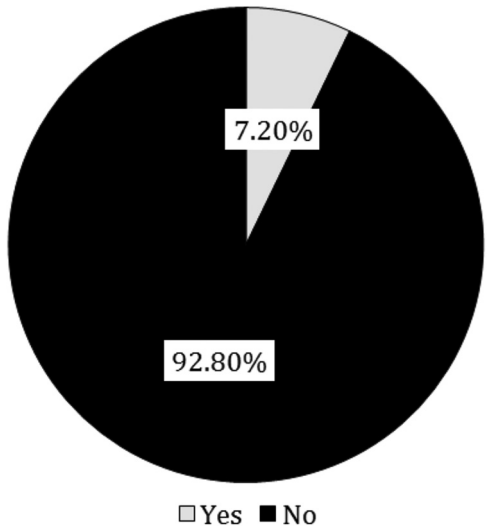

Figure 4: General incidence of respiratory morbidity.

morbidity among their babies was that between 31 and 40 years. This result is not consistent with that reported by Dileep et al.,[13] which showed no association between maternal age and neonatal respiratory morbidity; however, maternal age group between 30 and 40 is well known to be associated with overall neonatal morbidity and mortality. This can be attributed to the fact that there is an increased risk of chronic medical diseases (diabetes, hypertension, etc.)

Higher GA in our study was associated with lower chances of neonatal respiratory morbidity. This can be explained by better neonatal pulmonary functional development. These findings correlate well with those of Usher et al.[14] revealing that respiratory morbidity of new born is inversely proportional to the GA s.

This study has also revealed that there is a strong association between maternal educational level and the development of respiratory morbidity in their neonates with ECD at term. The higher the level of education, the lower the chance that neonates will develop respiratory morbidity. These findings were in line with some observations by Hagen et al.[15] This reflects that educated women are more likely to be good attendants at ANC clinic and more aware of complications of medical conditions that might develop during pregnancy, which potentially affect outcomes.

Our study also showed that boys were more likely than girls to develop respiratory morbidity. This is consistent with that reported by Khosla et al.,[11] who stated that boys are 25% more likely to develop respiratory morbidity than girls. The study clearly revealed that the rate of neonatal respiratory morbidity was in direct proportion with low birth weight.[16]

One limitation of this study is the lack of follow-up about the neonates for possible congenital pulmonary malformation or congenital heart disease that might be discovered later in life. Another limitation is that it was not clearly investigated that CD was not delayed or took place at right time, since, if delayed, it might have contributed to the perinatal morbidity.

Conclusion

Neonatal respiratory morbidity has been shown to be decreased with increasing GA and neonatal weight in ECD at term. The higher the maternal education, the lower will be neonatal respiratory morbidity. Male gender of the neonate was also associated with increased respiratory morbidity.

Acknowledgments

Our appreciation goes to the staff of Khartoum Teaching Hospital and Omdurman Maternity Hospital and to all patients who agreed to participate in this study.

References

1. Hamilton BE, Martin JA, Ventura SJ Births: preliminary data for 2005. *National vital statistics reports*, 2006;55(11):1–18.
2. Visco AG, Viswanathan M, Lohr KN, Wechter ME, Gartlehner G, Wu JM, Hartmann K. Cesarean delivery on maternal request: maternal and neonatal outcomes. Obst Gynecol 2006;108(6): 1517–29.
3. Ramachandrappa A, Jain L Elective cesarean section: its impact on neonatal respiratory outcome. Clin Perinatol 2008; 35(2), 373-393.
4. Signore C, Klebanoff M. Neonatal morbidity and mortality after elective cesarean delivery. Clin Perinatol 2008;35(2):361–71.
5. Hook B, Kiwi R, Amini SB, Fanaroff A, Hack M. Neonatal morbidity after elective repeat cesarean section and trial of labor. Pediatrics 1997;100(3):348–53.
6. Hansen AK, Wisborg K, Uldbjerg N, Henriksen TB. Elective caesarean section and respiratory morbidity in the term and near-term neonate. Acta Obstet Gynecol Scand 2007;86(4):389–94.

7. MacDorman MF, Declercq E, Menacker F, Malloy MH. Infant and neonatal mortality for primary cesarean and vaginal births to women with "no indicated risk," United States, 1998–2001 birth cohorts. Birth 2006;33(3):175–82.
8. Demissie K, Marcella SW, Breckenridge MB, Rhoads GG. Maternal asthma and transient tachypnea of the newborn. Pediatrics 1998;102(1):84–90.
9. Schatz M, Zeiger RS, Hoffman CP, Saunders BS, Harden KM, Forsythe AB. Increased transient tachypnea of the newborn in infants of asthmatic mothers. Am J Dis Child 1991;145(2):156–8.
10. Venkatesh VC, Katzberg HD. Glucocorticoid regulation of epithelial sodium channel genes in human fetal lung. Am J Physiol Lung Cell Mol Physiol 1997;273(1):L227–L233.
11. Khosla SS, Brehier A, Eisenfeld AJ, Ingleson LD, Parks PA, Rooney SA. Influence of sex hormones on lung maturation in the fetal rabbit. Biochim Biophys Acta 1983;750(1):112–126.
12. Keszler M, Carbone MT, Cox C, Schumacher RE. Severe respiratory failure after elective repeat cesarean delivery: A potentially preventable condition leading to extracorporeal membrane oxygenation. Pediatrics 1992;89(4):670–2.
13. Dileep A, Khan NB, Sheikh SS. Comparing neonatal respiratory morbidity in neonates delivered at term by elective Caesarean section with and without dexamethasone: retrospective cohort study. J Pak Med Assoc 2015;65(6):607–11.
14. Usher RH, Allen AC, McLean FH. Risk of respiratory distress syndrome related to gestational age, route of delivery, and maternal diabetes. Am J Obstet Gynecol 1971;111(6):826–32.
15. Hagen EW, Sadek-Badawi M, Palta M. Daycare attendance and risk for respiratory morbidity among young very low birth weight children. Pediatr Pulmonol 2009;44(11):1093–9.
16. Schieve LA, Meikle SF, Ferre C, Peterson HB, Jeng G, Wilcox LS. Low and very low birth weight in infants conceived with use of assisted reproductive technology. N Engl J Med 2002;346(10):731–7.

How to cite this article: Abdelgabar SA, Babikr WG, Elhussein AB, Hummeida ME. Risk of respiratory morbidity in elective cesarean delivery outcome infants at term. Int J Med Sci Public Health 2016;5:973-977

Source of Support: Nil, **Conflict of Interest:** None declared.