Clinical Investigation / Araştırma

DOI: 10.4274/tjod.galenos.2023.94831

Turk J Obstet Gynecol 2023;20:131-6

Effect of delivery mode on admission to neonatal intensive care unit in healthy singleton pregnancies

Term sağlıklı tekil gebeliklerde doğum şeklinin yenidoğan yoğun bakım ünitesine kabule etkisi

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Abstract

Objective: The aim of this study was to evaluate the short-term results of perinatal health in vaginal and cesarean deliveries and the indications for admission to the neonatal intensive care unit (NICU) in terms of healthy singleton pregnancies.

Materials and Methods: In this study, 300 pregnant women who gave birth in our tertiary hospital was included. The records of newborns admitted to the NICU of these pregnant women were reviewed between January 1, 2019 and January 1, 2021. Durations of newborn hospitalizations and problems encountered during admission were recorded. The results were statistically evaluated.

Results: There was no significant difference between vaginal delivery and cesarean section groups in terms of the indications for admission to the NICU of term low-risk pregnant women (p=0.91, p=0.17). A higher admission in the NICU was found in the early term group. The early term group required more respiratory support compared to the full term group (p=0.02). When the groups were compared in terms of IV fluid treatment support, hypoglycemia or feeding difficulty, and jaundice requiring phototherapy, no significant difference was found.

Conclusion: Withlimited data available for admission indications to the NICU of newborns born from term pregnancies, we found that the mode of delivery affects hospitalization indications of newborns, need for support, and Apgar scores. Early term delivery is associated with higher rates of neonatal morbidity and admission to the NICU. Better maternal care and prevention of factors that may lead to preterm birth will provide the prevention and management of these problems.

Keywords: Neonatal intensive care unit, neonatal outcome, morbidity

Öz

Amaç: Bu çalışmanın amacı term sağlıklı tekil gebelerde vajinal ve sezaryen doğumlarda yenidoğan yoğun bakım ünitesine yatış endikasyonlarını ve perinatal sağlığın kısa dönem sonuçlarını değerlendirmektir.

Gereç ve Yöntemler: 1 Ocak 2019 - 1 Ocak 2021 tarihleri arasında üçüncü basamak hastanemizde doğum yapan toplam 300 gebe çalışmaya dahil edildi. Bu gebelerden yenidoğan yoğun bakım ünitesine yatırılan bebeklerin kayıtları incelendi. Hastanede yatış endikasyonları, süreleri ve yatış sırasında karşılaşılan sorunlar kayıt altına alındı ve sonuçlar istatistiksel olarak değerlendirildi.

Bulgular: Term düşük riskli gebelerde vajinal doğum ve sezaryen grupları arasında yenidoğan yoğun bakım ünitesine (YYBÜ) yatış endikasyonları açısından anlamlı fark bulunmadı (p=0,91; p=0,17). Erken term grubunda YYBÜ'ye yatış oranı daha yüksek bulundu. Erken term grubu, full term grubuna kıyasla daha yüksek solunum desteği ihtiyacına sahipti (p=0,02). İv sıvı tedavisi ihtiyacı, hipoglisemi veya beslenme güçlüğü ve fototerapi gerektiren sarılık açısından karşılaştırıldığında; gruplar arasında anlamlı fark bulunmadı.

PRECIS: We concluded that the mode of delivery affects hospitalization indications of newborns, need for support, and Apgar scores. Early term delivery is associated with higher rates of neonatal morbidity and admission to the NICU.

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Received/Geliş Tarihi: 04.11.2022 **Accepted/Kabul Tarihi:** 03.05.2023

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Turkish Journal of Obstetrics and Gynecology published by Galenos Publishing House.

Sonuç: Term gebeliklerden doğan yenidoğanların hastaneye yatış endikasyonlarıyla ilgili mevcut veriler sınırlıdır. Doğum şekli yenidoğanların hastaneye yatış endikasyonlarını, destek ihtiyacını ve Apgar skorlarını etkiler. Erken termde doğum daha yüksek oranda neonatal morbidite ve YDYB yatışı ile ilişkilidir. Daha iyi maternal bakım ve erken doğuma yol açabilecek faktörlerin engellenmesi olası sorunların önlenmesini ve yönetilmesini sağlayacaktır.

Anahtar Kelimeler: Yenidoğan yoğun bakım ünitesi, yenidoğan sonuç, morbidite

Introduction

The definition of term pregnancy is relative. Increasing evidence has shown that neonatal outcomes of early- and full-term infants are different. Early-term newborns have more respiratory distress requiring mechanical ventilation and longer hospital stays. Mortality is increased in these cases. Neonatal intensive care unit (NICU) admission probability compared to term infants is significantly higher[1,2].There appears to be a sustained relationship between neonatal morbidity and gestational age in specific term and preterm labors[3].

For the fetus, the effects of labor on the baby are not clear. Ongoing pregnancies may result in stillbirth or the need for NICU. Some studies indicate that patients who delivered vaginally need NICU at a higher rate than pregnant women who gave birth by cesarean section. In a study comparing cesarean and vaginal deliveries, the number of newborns with an Apgar score below 7 in the first minute was found to be higher in the cesarean section group. In the same study, the 7th minute Apgar score and umbilical cord pH were found to be similar between the two groups[4,5]. Cesarean deliveries can be a life-saving procedure. Adverse events may occur in both mothers and newborns[6,7].

While asphyxia, trauma and meconium aspiration decrease in cesarean delivery, the risk of transient tachypnea of the newborn, surfactant deficiency and respiratory distress secondary to pulmonary hypertension increases. Physiological events in the last weeks of pregnancy are accompanied by changes in the hormonal environment of the fetus and mother with the onset of spontaneous delivery. The fetus is prepared for neonatal transition[8].

The most common neonatal complications in admission to the NICU are respiratory morbidity, hypoglycemia, and sepsis. Newborn pulmonary problems, especially respiratory distress syndrome (RDS), may follow cesarean delivery. Moreover, the admission of the newborn to the NICU has various negative effects on the family[9].

In the literature, there are insufficient evidence evaluating the indications for admission to NICU in term healthy singleton pregnancies according to the mode of delivery. In this study, we evaluated the short-term results of perinatal health in vaginal and cesarean deliveries and the indications for admission to the NICU.

Materials and Methods

The study was planned retrospectively and approved by the ethics committee at the Ankara City Hospital (approval no: E1-20-295).

The hospital records of pregnant women hospitalized for delivery in Ankara City Hospital NICU between January 1, 2019 and January 2021 were analyzed from accumulated data. Women who gave consent for the study were between 37th and 42nd gestational weeks so they are term healthy singleton pregnant women without any additional systemic diseases. Vaginal delivery and cesarean section were included. Due to the need for intensive care, the babies were hospitalized and then discharged as healthy. The data of the patients were obtained retrospectively from computer records and patient files. Deliveries were categorized according to weeks of gestation. The date of the last menstrual period was taken as the basis for determining the gestational age. When pregnant women whose ultrasound measurements were inconsistent with the last menstrual period or in those who did not know or remember the last menstrual period, gestational age was determined according to the earliest ultrasound measurements.

Those who were born under 37 weeks, pre-pregnancy genital and extragenital disease, hypertension, preeclampsia, gestational diabetes, goiter, anxiety and depressive disease, drug addiction, multiple pregnancy, maternal age below 18 and over 45, fetuses with anomalies in detailed ultrasonography, patients with premature rupture of membranes, additional systemic disease, obstetric conditions that may cause premature or emergency delivery, pre-eclampsia and those whose medical records could not be reached were excluded from the study. Indications for NICU admission and maternal demographic and labor characteristics were retrospectively evaluated from the file records. Demographic data collected included; age, gravidity, parity, gestational age at cesarean section, birth weight, hypoglycemia, length of hospitalization, respiratory morbidity, need for NICU admission, mechanical ventilation and phototherapy.

Statistical Analysis

All data related to the disease were recorded in SPSS 22.0 (SPSS for Windows Evaluation, Illinois, Chicago, USA) and statistical analyses were performed. Arithmetic mean ± standard deviation for descriptive parametric data from the vaginal labor group and the cesarean section group, and ratios and percentages were used for nonparametric data. The distribution of the data was evaluated by the Kolmogorov-Smirnov test. The independent t test or Mann-Whitney U test was used to compare parametric values between the two groups. Nonparametric values were compared between the two groups by Pearson's chi-square test or Fisher's exact test. $P<0.05$ was considered statistically significant.

Results

A three hundred pregnant women were included in this study group. One hundred eighty two had vaginal deliveries and 118 had cesarean deliveries. The main demographic characteristics of the patients are shown in Table 1.

There was no significant difference between the distribution of the mean age of women according to the mode of delivery. The mean gestational age of women was 37.6±1.9 weeks and 37.3±1.8 weeks for the vaginal delivery group and the cesarean group respectively (p>0.05, p=0.37). There was no statistically significant difference between the groups in terms of duration of hospital stay, estimated fetal weight, newborn birth weight and birth length (p>0.05, p=0.23, p=0.12, p=0.84, and p=0.74 respectively). The rates of pregnant women with premature rupture of membranes were 18.6% and 11.8% for the vaginal delivery group and the cesarean group, respectively (Table 2). The indications for admission to the NICU were compared according to the mode of delivery. Transient tachypnea of the newborn was 6.4% in the vaginal delivery group and 21.1% in the cesarean section group. Meconium-stained amniotic fluid was 11.5% and 9.3% for the vaginal delivery group and cesarean group respectively. Congenital pneumonia was 3.2% and 3.3% respectively. Early sepsis was 3.8% and 2.5% respectvely. There was no significant difference between vaginal delivery and cesarean section groups in terms of indications for admission to the NICU (p>0.05). The results are summarized in Table 3.

Hundred and forty early - term and 160 full - term pregnant women were hospitalized. A higher admission to the NICU was found in the early-term group. The early term group had a higher need for respiratory support compared to the full term group (p<0.05, p=0.02). When the groups were compared for need iv fluid treatment, hypoglycemia, feeding difficulty, and jaundice requiring phototherapy, there was no significant difference (p>0.05, p=0.36, p=0.32, and p=0.21 respectively) Table 4.

Table 1. Demographic and clinical characteristics

Age, years (Mean ± SD)	27.3±5
Gravidity, (Mean ± SD)	2.2±1.2
Gestational age at delivery, weeks (Mean ± SD)	37.5±1.9
Gestational age at delivery according to Ultrasound (Mean ± SD)	37.4±1.8
Weight gain during pregnancy (kg) (Mean ± SD)	12.4±4.4
Estimated fetal weight (g) (Mean ± SD)	3450±390
Birth weight (g) (Mean ± SD)	3133±485
Birth length (cm) (Mean ± SD)	34.9±1.7
APGAR score min 5, (Mean ± SD)	6.8±1.1
APGAR score min10 (Mean ± SD)	8.5±0.9
SD: Standard deviation	

Discussion

Neonatal morbidity rates vary with the mode of delivery. The infants born by cesarean section are more likely to develop respiratory morbidity. In contrast, infants born vaginally are more likely to develop intracranial hemorrhage, brachial plexus injury, and culture-positive neonatal sepsis[10-11].

Life-threatening maternal outcomes are more common in cesarean deliveries regardless of previous vaginal delivery history. In the literature, the age ranges of pregnant women vary in studies investigating the indications for admission in the NICU according to the mode of delivery[12-13].

Catalano and Sacks[13] found 31.2±5.7 years for pregnant women. Similar to our study, in another study, the mean age was again 29.3±6.6 years. In our study, the mean age of pregnant women was 27.3±5 years. Similar studies have revealed that the age of women giving birth differs between 27 and 38.9 years[14].

Transient tachypnea of the newborn was first described by Avery et al.[15] in 1966. The main cause is the inability to excrete

Table 2. Comparison of neonatal obstetric outcomes according to delivery mode

		Vaginal labor 182	Cesarean section:118	p-value
Age, years (Mean ± SD)[a]		27.1±5.4	27.8±5.5	0.37
Gestational age at delivery, weeks (Mean ± SD)[a]		37.6±1.9	37.3±1.8	0.73
Gestational age at delivery according to ultrasound (Mean ± SD)[a]		37.4±1.9	37.4±1.8	0.16
Weight gain during pregnancy (g) (Mean ± SD)[a]		12.2±4	12.8±4.9	0.23
The duration of hospital stay Stay (day) (mean ± SD)[a]		2.5±1.3	1.7±1.1	0.23
Estimated fetal weight (Mean ± SD)[a]		3445±294	3464±332	0.12
Birth weight (g) (Mean ± SD)[a]		3113±487	3169±481	0.84
Birth length (cm) (Mean ± SD)[a]		34±1.4	34±2.06	0.74
Premature rupture of membranes n (%)[b]		34 (18.6)	14 (11.8)	0.16
Meconium-stained amniotic fluid n (%) [b]		32 (17.5)	20 (16.9)	0.87
Apgar score	1.minute (Mean ± SD)[a]	9.00±0.708	8.00±0.806	0.74
	5.minute (Mean ± SD)[a]	10.00±0.305	9.00±0.417	0.86
A p-value <0.05 is considered statistically significant, A: Independent sample t test was used in statistical analyses, B: Pearson chi-square test was used in statistical analyses. G: Gram, cm: Sentimeter, H: Hour, min: Minutes				

Table 3. Comparison of the indications on admission to NICU according to delivery mode

	Vaginal labor:182	Cesarean section :118	p-value
Transient tachypnea of the newborn, n (%)[b]	12 (6.5)	25 (21.1)	0.91
Respiratuar distress sendrome, n (%)[b]	5 (2.7)	10 (11.8)	0.17
Meconium aspiration (%)[b]	21 (11.5)	11 (9,3)	0.21
Congenital pneumonia, n (%)[b]	6 (3.2)	4 (3.3)	0.15
Early sepsis, n (%)[b]	7 (3.8)	3 (2.5)	0.72
Neonatal asphyxia, n (%)[b]	11 (6.04)	8 (6.7)	0.48
Congenital heart disease, n (%)[b]	5 (2.7)	3 (2.6)	0,35
Pneumothorax, n (%)[b]	2 (1.09)	3 (2.5)	0.40
Cyanotic events n (%)[b]	4 (2.1)	5 (4.2)	0.90
Jaundice requiring phototherapy, n (%)[b]	13 (7.1)	5 (4.2)	0.36
Hypoglycemia, n (%)[b]	8 (4.3)	9 (7.16)	0.87
Hypothermia, n (%)[b]	1 (0.5)	2 (1.6)	0.20
Neonatal death†	0	0	
Days of hospital stay[a]	1.9±1.3	2.7±1.8	0.26

A p-value <0.05 is considered statistically significant, A: Independent sample t-test was used in statistical analyses, B: Pearson chi-square test was used in statistical analyses. G: Gram, cm: Centimeter, H: Hour, min: Minutes, NICU: Neonatal intensive care unit

Table 4. Comparison of morbidities of early- and full-term newborns

Indications on admission to NICU	Early term pregnant:140	Full - term pregnant :160	p-value
Need for respiratory support n (%)	25 (17.8)	12 (7.5)	0.02*
Hypoglycemia, n (%)	12 (8.5)	9 (5.6)	0.36
Iv fluid therapy, n (%)	36 (25.7)	29 (18.1)	0.49
Feeding difficulty n (%)	19 (11.8)	15 (9.3)	0.32
Jaundice requiring phototherapy n (%)	15 (10.7)	12 (7.5)	0.21

*p-value <0.05 is considered statistically significant. A: Independent sample t-test was used in statistical analyses, B: Pearson chi-square test was used in statistical analyses. G: Gram, cm: Centimeter, H: Hour, min: Minutes

fluid. In our study, temporary tachypnea was found in 12 and 25 newborns in the term low-risk vaginally delivery group and newborns in the cesarean section group, respectively. The results were consistent with the literature[16].

In the study of Dani et al.[17], 11% of the newborns were admitted to the intensive care unit due to respiratory problems. RDS were diagnosed in 6% of them. In our study, the RDS rates were 2.7 and 11.8 for the vaginal delivery group and the cesarean group, respectively.

Mothers who had vaginal labor started breastfeeding earlier than those who had cesarean section. Especially women who have general anesthesia during C-sections start breastfeeding later than those who gave labor vaginally. It is thought that there may be a significant decrease in the comfort of mothers compared to those who gave vaginal labor due to reasons such as pain, fatigue, and negative effects of anesthesia after cesarean delivery[16]. In our study, feeding difficulty was seen in 11.8% and 9.8% of early term newborns and full-term newborns, respectively.

In the literature, Apgar scores of newborns were examined according to delivery mode. 1st and 5th minute Apgar scores of newborns with vaginal delivery were found to be higher than cesarean section deliveries[18-20]. In our study, there was no difference between the two groups according to Apgar scores (p>0.05).

In obstetric and pediatric practice, late preterm infants are often considered functionally and developmentally mature and are often managed by protocols developed for full-term infants. It is well known that cesarean delivery is an important factor that causes morbidity in newborns[13]. Cesarean delivery has been reported to cause a longer hospital stay and more respiratory morbidities[11,12]. In our study, the most common cause of admission to the NICU was respiratory morbidities. Transient tachypnea of the newborn is the most common among these morbidities. In line with the literature, the hospital stay was longer in the cesarean delivery group[21,22].

Hypoglycemia and electrolyte disorders are reported to be more common morbidities in early-term newborns. In our study, hypoglycemia was more common in early-term newborns. Our finding was consistent with the literature. However, when compared with term newborns, it was not statistically significant. In our study, more dehydration was observed in premature term newborns. IV hydration was applied to them[23]. The need for IV antibiotic therapy was higher in the early-term group in our study, as indicated in the literature[21]. Antibiotic treatment was given with the indication of maternal urinary tract infection and positive cervical culture.

When the literature was reviewed, Binarbaşı et al.[24] found feeding problems with a rate of 9.1% in a study on late preterm infants. In addition, the admission rate due to nutritional intolerance was found to be 5.3%. In our study, it was found to be 11.8 in early term and 9.3 in late term pregnancies. As stated in the literature, this can be explained by the slower sucking of these babies and the more frequent feeding intolerance. Since a significant number of newborns were hospitalized due to respiratory distress, the delayed onset of feeding can also be considered as a factor[24].

McIntire and Lenevo[25] compared the neonatal outcome of late preterm infants with that of infants born at 39 weeks of gestation. Overall, the rate of neonatal morbidity in their report

seems to be higher than in our study, especially about respiratory complications and clinical jaundice requiring phototherapy. In contrast to our study, cesarean delivery was not associated with an increased risk of neonatal morbidity. In the study of Bastek et al.[26] cesarean delivery was a significant risk factor for neonatal morbidity. The relationship of respiratory complications with parity was not reported in previous studies.

In recent years, the effect of mode of delivery (eg, vaginal delivery or cesarean section) on newborns born from term pregnancies has been examined due to the increasing rates of cesarean section and their association with allergic and autoimmune diseases[27,28].

In our study, in terms of meconium-stained amniotic fluid, there was no significant difference between cesarean section and vaginal delivery groups (p=0.87). Other small-sample studies also showed no significant difference in meconium between newborns delivered by C-section and vaginally[29].

Hu et al. evaluated meconium-stained amniotic fluid microbiota in full-term cesarean section and vaginal birth groups.

Their study reported no significant differences in the meconium microbiota of full-term vaginally and cesarean section-delivered newborns[30].

We could not evaluate the meconium microbiota in our study because we had no data.

Study Limitations

There are several limitations to our study, which are mainly related to its retrospective design and relatively small number of patients. The study was single-center. Late preterm babies may be more likely to be diagnosed with more subjective diagnoses (transient tachypnea of the newborn, sepsis diagnosis) than term babies. However, Another limitation is that we do not have data on long - term neonatal outcomes.

Conclusion

With the limited data available for admission indications on term pregnancies, the results of the study showed that the mode of delivery affects the indications for hospitalization, the need for help and support, and the Apgar scores of newborns. This finding should be considered while deciding on the mode of delivery. However, in cases where vaginal delivery is not possible or delayed delivery is dangerous for the mother or the baby, cesarean section should be performed.

Ethics

Ethics Committee Approval: The study was planned retrospectively and approved by the ethics committee at the Ankara City Hospital (approval no: E1-20-295).

Informed Consent: Informed consent was obtained.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: F.E.C., Concept: H.U., Design: R.B.F., Data Collection or Processing: F.E.A., Analysis or Interpretation: Ö.U., Ö.M.T., Literature Search: H.U., Writing: H.U.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Tita AT, Landon MB, Spong CY, Lai Y, Leveno KJ, Varner MW, et al. Timing of elective repeat cesarean delivery at term and neonatal outcomes. N Engl J Med 2009;360:111-20.
2. Reddy UM, Bettegowda VR, Dias T, Yamada-Kushnir T, Ko CW, Willinger M. Term pregnancy: a period of heterogeneous risk for infant mortality. Obstet Gynecol 2011;117:1279-87.
3. Melamed N, Klinger G, Tenenbaum-Gavish K, Herscovici T, Linder N, Hod M, et al. Short-term neonatal outcome in low-risk, spontaneous, singleton, late preterm deliveries. Obstet Gynecol 2009;114:253-60.
4. Signore C, Hemachandra A, Klebanoff M. Neonatal mortality and morbidity after elective cesarean delivery versus routine expectant management: a decision analysis. Semin Perinatol 2006;30:288-95.
5. Clark SL, Hankins GD. Temporal and demographic trends in cerebral palsy--fact and fiction. Am J Obstet Gynecol 2003;188:628-33.
6. Daniel S, Viswanathan M, Simi BN, Nazeema A. Comparison of fetal outcomes of emergency and elective caesarean sections in a teaching hospital in Kerala Acad Med J India 2014;2:32-6.
7. Oladapo OT, Lamina MA, Sule-Odu AO. Maternal morbidity and mortality associated with elective Caesarean delivery at a university hospital in Nigeria. Aust N Z J Obstet Gynaecol 2007;47:110-4.
8. Ramachandrappa A, Jain L. Elective cesarean section: its impact on neonatal respiratory outcome. Clin Perinatol 2008;35:373-93.
9. Paganelli S, Soncini E, Gargano G, Capodanno F, Vezzani C, La Sala GB. Retrospective analysis on the efficacy of corticosteroid prophylaxis prior to elective caesarean section to reduce neonatal respiratory complications at term of pregnancy: review of literature. Arch Gynecol Obstet 2013;288:1223-9.
10. Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. Br J Obstet Gynaecol 1995;102:101-6.
11. Mercer BM, Gilbert S, Landon MB, Spong CY, Leveno KJ, Rouse DJ, et al. Labor outcomes with increasing number of prior vaginal births after cesarean delivery. Obstet Gynecol 2008;111:285-91.
12. Engle WA. Morbidity and mortality in late preterm and early term newborns: a continuum. Clin Perinatol 2011;38:493-516.
13. Catalano PM, Sacks DA. Timing of indicated late preterm and early-term birth in chronic medical complications: diabetes. Semin Perinatol 2011;35:297-301.
14. Haahr T, Glavind J, Axelsson P, Bistrup Fischer M, Bjurström J, Andrésdóttir G, et al. Vaginal seeding or vaginal microbial transfer from the mother to the caesarean-born neonate: a commentary regarding clinical management. BJOG 2018;125:533-6.
15. Avery ME, Gatewood OB, Brumley G. Transient tachypnea of newborn. Possible delayed resorption of fluid at birth. Am J Dis Child 1966;111:380-5.
16. Yılmaz S. Vajinal Yol ve Sezaryenle Dogum Yapan Kadınların Dogumdan Sonra Kendi ve Yeni Dogan Bakımında Yasadığı Sorunlar, Yüksek Lisans Tezi, Sivas, 2002.

17. Dani C, Mosca F, Vento G, Tagliabue P, Picone S, Lista G, et al. Effects of surfactant treatment in late preterm infants with respiratory distress syndrome. J Matern Fetal Neonatal Med 2018;31:1259-66.
18. Bland RD, Bressack MA, McMillan DD. Labor decreases the lung water content of newborn rabbits. Am J Obstet Gynecol 1979;135:364-7.
19. Gowen CW Jr, Lawson EE, Gingras J, Boucher RC, Gatzy JT, Knowles MR. Electrical potential difference and ion transport across nasal epithelium of term neonates: correlation with mode of delivery, transient tachypnea of the newborn, and respiratory rate. J Pediatr 1988;113:121-7.
18. Tarnow-Mordi WO, Shaw JC, Liu D, Gardner DA, Flynn FV. Iatrogenic hyponatraemia of the newborn due to maternal fluid overload: a prospective study. Br Med J (Clin Res Ed) 1981;283:639-42.
21. Sengupta S, Carrion V, Shelton J, Wynn RJ, Ryan RM, Singhal K, et al. Adverse neonatal outcomes associated with early-term birth. JAMA Pediatr 2013;167:1053-9.
22. Parikh LI, Reddy UM, Männistö T, Mendola P, Sjaarda L, Hinkle S, et al. Neonatal outcomes in early term birth. Am J Obstet Gynecol 2014;211:265.e1-11.
23. Infant of A Diabetic Mother. In: Gomella TL, Cunningham MD, Eyal FG (eds). Lange Neonatology. 7th ed. Mc Grow-Hill Education 2013;709-15.
24. Binarbaşı P, Akın Y, Narter F, Telatar B, Polatoğlu E, Ağzıkuru T. Geç preterm yenidoğanlarda hastalık ve ölüm oranları. Türk Ped Arş 2013;48:17-22.
25. McIntire DD, Leveno KJ. Neonatal mortality and morbidity rates in late preterm births compared with births at term. Obstet Gynecol 2008;111:35-41.
26. Bastek JA, Sammel MD, Paré E, Srinivas SK, Posencheg MA, Elovitz MA. Adverse neonatal outcomes: examining the risks between preterm, late preterm, and term infants. Am J Obstet Gynecol 2008;199:367.e1-8.
27. Chen H, Tan D. Cesarean Section or Natural Childbirth? Cesarean Birth May Damage Your Health. Front Psychol 2019;10:351.
28. Osterman MJ, Martin JA. Trends in low-risk cesarean delivery in the United States, 1990-2013. Natl Vital Stat Rep 2014;63:1-16.
29. Dong XD, Li XR, Luan JJ, Liu XF, Peng J, Luo YY, et al. Bacterial communities in neonatal feces are similar to mothers' placentae. Can J Infect Dis Med Microbiol 2015;26:90-4.
30. Hu J, Nomura Y, Bashir A, Fernandez-Hernandez H, Itzkowitz S, Pei Z, et al. Diversified microbiota of meconium is affected by maternal diabetes status. PLoS One 2013;8:e78257.