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The Comparison of Perinatal Outcomes in Early Delivery Versus Postdate Labor

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Abstract

Background: Prenatal mortality and morbidity increase after 40 weeks of gestation. The current study aimed at comparing maternal and neonatal outcomes between term and postterm pregnancies.

Methods: The current prospective cohort study was performed on 1180 singleton, cephalic fetus, and uncomplicated pregnancy cases admitted for labor. Pregnant mothers were divided into 3 groups. Group 1 included 750 cases in 38 to 40 weeks, group 2 included 250 cases in 40 to 41 weeks, and group 3 included 180 cases in over 41 weeks of gestation. Prenatal outcomes were recorded as: fetal distress, meconium passage, meconium aspiration, fetal weight $\geq$ 4 kg, Apgar score in 1 and 5 minutes, neonatal intensive care unit (NICU) admission, maternal infection, postpartum hemorrhage, and the rate of cesarean section.

Results: There were significant differences in the rate of fetal distress ($P < 0.001$), meconium passage ($P = 0.001$), meconium aspiration syndrome ($P < 0.001$), Apgar score ≤ 3 at 1 ($P = 0.025$) and 5 minutes ($P < 0.001$), admission to NICU ($P < 0.001$), rate of cesarean section ($P < 0.001$), and maternal infection ($P = 0.001$) among the groups. The frequency of fetal distress was lower in group1 compared with group 2 (1.6% versus 4.4%; $P = 0.011$). Also fetal distress was significantly lower in group 1 than group 3 (1.6% versus 10.9%; $P < 0.001$). The meconium passage and meconium aspiration syndrome were statistically lower in group 1 compared with group 2 (1.6% versus 8%; $P < 0.001$ for meconium passage, and 0.9% versus 5.6%; $P < 0.001$ for meconium aspiration syndrome). Also meconium passage and meconium aspiration syndrome were significantly lower in group 1 compared with group 3 (1.6% versus 13.9%; $P < 0.001$ for meconium passage, and 0.9% versus 10%; $P < 0.001$ for meconium aspiration syndrome). The cesarean section was more frequent in group 2 compared with group 1 (24.8% versus 13.6%; $P < 0.001$) and in group 3 compared with group 1 (33.3% versus 13.6%, $P < 0.001$). There was no significant difference in the mean fetal weight, fetal weight $\geq$ 4 kg, and postpartum hemorrhage in females between the 3 groups.

Conclusions: Late-term and postterm births are associated with higher rates of fetal and neonatal morbidity and maternal risks compared to pregnancy termination before 40 weeks of gestation, and earlier birth induction is recommended in such cases.

Keywords: Pregnancy Complications, Postdate Pregnancy, Term Pregnancy, Prenatal Complications

1. Introduction

The mean duration of a normal pregnancy is 40 weeks of gestation. Based on the World health organization (WHO) definitions, postdate delivery lasting 42 weeks or more is referred to postterm, and the pregnancies between 40 and 41 + 6 weeks as late-term deliveries (1). Full term pregnancy is defined by the American Congress of Obstetricians and Gynecologists as 39 to 40 weeks of gestation (2, 3).

More than 40% of all pregnant mothers give birth after 40 weeks (1). The pregnant population > 41 weeks constitutes 15% - 20% of all pregnancies (4) and postterm birth rates is observed in a range of 0.4% to 8.1% (5). Postdate deliveries are associated with fetal, neonatal, and maternal risks (6, 7).

Fetal and neonatal complications of postterm and late-term pregnancies are macrosomia, fetal dysmaturity, increased risk of umbilical cord compression due to oligohydramnios, abnormal antepartum or intrapartum fetal heart rate patterns due to placental insufficiency or cord compression, meconium passage and aspiration, and prenatal deaths (6-8). The long-term effects of postterm birth are unclear, but may include neurologic risks such as epilepsy and cerebral palsy (9, 10).

Maternal risks of postterm pregnancy include an increased frequency of failed induction, 3rd and 4rd degree perinea lacerations, infection, and postpartum hemorrhage (9-12). Management of pregnant mothers with no onset of labor ranges from expectant management consisting of intensive monitoring of mother and fetus to in-

duction of labor (1). The American College of Obstetricians and Gynecologists recommends induction of labor after 42 weeks of gestation, but considers induction at 41 to 42 weeks reasonable (13).

Most of the obstetricians prefer expectant management with monitor fetal well-being, twice weekly in 40 to 41weeks and they choose induction of pregnancies at 41weeks of gestation to reduce prenatal mortality and morbidity. They suggest that induction of labor at 40 to 41weeks in uncomplicated pregnancy has overall similar outcomes compared with expectant management and termination of the pregnancy, which is indicated when results of the recent examinations indicate a risk for mother or child. They believe that this is a reasonable approach, because of the low absolute rate of fetal death in late-term and the relatively high number of inductions that would be required to prevent one prenatal death (14-18).

In contrast, prenatal mortality and morbidity increase with increasing gestational age after 40 weeks (5). For mothers at 40 weeks of gestation, some obstetricians suggest induction rather than expectant management to reduce prenatal mortality and morbidity or cesarean delivery rates (14, 17, 19).

The current study compared neonatal and maternal complications in mothers with 38 to 40, 40 to 41, and > 41 weeks of gestation.

2. Methods

After approval by the ethics committee, the current prospective, cohort study was performed on1180 singleton and uncomplicated pregnant mothers admitted for labor in Arash hospital in Tehran, Iran, from 2014 to 2015. Mothers with singleton, cephalic, and low risk pregnancies $\geq$ 38 weeks of gestation were included.

Females with underlying diseases, drug users, previous cesarean delivery, and fetus with anomaly in ultrasound, multiple gestations, non-cephalic presentations, and complicated pregnancies were excluded.

Pregnant mothers were divided into 3 groups: Group 1 included 750 cases in 38 to 40 weeks, group 2 included 250 cases in 40 to 41weeks, and group 3 included 180 cases in more than 41 weeks of gestation. Pregnant females were observed for vital signs, progress of labor, and electronic monitoring of fetal heart rate. Mode of delivery, fetal weight, Apgar score in 1 and 5 minutes, fetal distress, meconium passage, meconium aspiration in fetus, neonatal intensive care unit (NICU) admission, maternal infection, and postpartum hemorrhage were recorded as outcomes of the study.

2.1. Data Analysis

All data analyses were conducted using SPSS version 21.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics for continuous variables were presented as mean $\pm$ standard deviation (SD) and for categorical variables as numbers (percentage). The baseline characteristics, primary and secondary outcomes of the 3 groups were compared using one-way ANOVA test (followed by Scheffe post hoc test) for continuous variables and the Chi-square test for categorical variables. All statistical tests were 2-sided and the level of statistical significance was 0.05.

3. Results

Baseline and demographic characteristics are shown in Table 1. There was significant statistical differences in the rate of fetal distress ($P < 0.001$), meconium passage ($P = 0.001$), meconium aspiration syndrome ($P < 0.001$), Apgar score ≤ 3 in new born at 1 ($P = 0.025$) and 5 minutes ($P < 0.001$), and required NICU admission ($P < 0.001$) among the 3 groups (Table 1).

Also, there were significant differences among the 3 groups in the rate of cesarean section ($P < 0.001$) and maternal infection ($P = 0.001$) (Table 1). There were no significant difference in the fetal weight $\geq$ 4 kg and postpartum hemorrhage among females (Table 1).

Results were also compared between group 1 and group 2 (Table 2).

The frequency of fetal distress was lower in group 1 compared with group 2 (1.6% versus 4.4%; $P = 0.011$). The meconium passage and meconium aspiration syndrome were statistically lower in group 1 as compared with group 2 (1.6% versus 8%; $P < 0.001$ for meconium passage, and 0.9% versus 5.6%; $P < 0.001$ for meconium aspiration syndrome).

The rate of cesarean section was more frequent in group 2 compared with group 1 (24.8% versus 13.6%; $P < 0.001$).

Results were also compared between group 1 and group 3 (Table 3).

The rate of fetal distress was significantly lower in group 1 than group 3 (1.6% versus 10.9%; $P < 0.001$).

Also meconium passage and meconium aspiration syndrome were significantly lower in group 1 than group 3(1.6% versus 13.9%; $P < 0.001$ for meconium passage, and 0.9% versus 10%; $P < 0.001$ for meconium aspiration syndrome).

The rate of cesarean section was significantly higher in group 3 compared with group 1 (5.6% versus 10%; $P < 0.001$).

The rate of fetal distress (4.4% versus 10.6%; $P = 0.013$) and meconium passage (33.3% versus 13.6%; $P < 0.001$) were significantly higher in group 3 compared with group 2.

Table 1. Baseline and Demographic Characteristics in the Study Groups[a]

	38 - 40 Weeks of Gestation (n = 750)	40 - 41 Weeks of Gestation (n = 250)	Above 41 Weeks of Gestation (n = 180)	P Value
Age, y	27.06 ± 5.73	27.50 ± 5.34	27.41 ± 5.39	0.487
Birth weight, g	3398.13 ± 619.84	3433.00 ± 542.88	3421.11 ± 554.63	0.693
Parity				0.123
1	382 (50.9)	128 (51.2)	92 (51.1)	
≥ 2	368 (49.1)	122 (48.8)	88 (48.9)	
Birth weight ≥ 4000 g				0.959
Yes	147 (19.6)	50 (20)	34 (18.9)	
No	603 (80.4)	200 (80)	146 (81.1)	
1-Minute Apgar score				0.025
0 - 3	18 (2.4)	12 (4.8)	11 (6.1)	
4 - 6	116 (15.5)	42 (16.8)	37 (20.6)	
≥ 7	616 (82.1)	196 (78.4)	132 (73.3)	
5-Minute Apgar score				< 0.001
0 - 3	5 (0.7)	7 (2.8)	6 (3.3)	
4 - 6	12 (1.6)	10 (4)	13 (7.2)	
≥ 7	733 (97.7)	233 (93.2)	161 (89.4)	
Fetal distress				< 0.001
Yes	12 (1.6)	11 (4.4)	19 (10.6)	
No	738 (98.4)	239 (95.6)	161 (89.4)	
Meconium passage				< 0.001
Yes	12 (1.6)	20 (8)	25 (13.9)	
No	737 (98.4)	230 (92)	155 (86.1)	
Meconium aspiration				< 0.001
Yes	7 (0.9)	14 (5.6)	18 (10)	
No	743 (99.1)	236 (94.4)	162 (90)	
NICU admission				< 0.001
Yes	12 (1.6)	10 (4)	12 (6.66)	
No	738 (98.4)	240 (96)	168 (93.34)	
Cesarean section				< 0.001
Yes	102 (13.6)	62 (24.8)	60 (33.3)	
No	648 (86.4)	188 (75.2)	120 (66.7)	
Postpartum hemorrhage				0.412
Yes	20 (2.66)	7 (2.8)	5 (2.77)	
No	730 (97.34)	243 (97.2)	175 (97.23)	
Maternal infection				< 0.001
Yes	25 (3.33)	30 (12)	28 (15.55)	
No	725 (96.67)	220 (88)	152 (84.45)	

[a] Values are expressed as mean ± SD or No. (%).

There were no significant difference in the rate of meconium aspiration syndrome, Apgar score ≤ 3 of newborn at 1and 5 minutes, NICU admission, rate of cesarean section, maternal infection, and postpartum hemorrhage between the groups 2 and 3 (Table 4).

4. Discussion

In the current study, the rate of fetal distress, meconium passage, meconium aspiration syndrome, and required NICU admission increased after 40 weeks, compared with earlier weeks of gestation; there was significant differences in the rate of cesarean section and maternal infection among the 3 groups, but prenatal adverse outcomes, in group 2 with 40 to 41 weeks of gestation, such as the rate of meconium aspiration syndrome, Apgar score ≤ 3 of newborn at 1 and 5minutes, NICU admission, and the rate of cesarean section were similar to those of group 3 with > 41 weeks of gestation.

Some researchers suggest that induction of labor and early termination of term pregnancies had a lower incidence of meconium aspiration, low Apgar scores, postma-

Table 2. Baseline and Demographic Characteristics in Groups 1 and 2 of the Study[a]

	38 - 40 Weeks of Gestation (n = 750)	40 - 41 Weeks of Gestation (n = 250)	P Value
Age, y	27.06 ± 5.73	27.50 ± 5.34	0.287
Birth weight, g	3398.13 ± 619.84	3433.00 ± 542.88	0.428
Parity			0.312
1	382 (50.9)	128 (51.2)	
≥ 2	368 (49.1)	122 (48.8)	
Birth weight ≥ 4000 g			0.890
Yes	147 (19.6)	50 (20)	
No	603 (80.4)	200 (80)	
1-Minute Apgar score			0.127
0 - 3	18 (2.4)	12 (4.8)	
4 - 6	116 (15.5)	42 (16.8)	
≥ 7	616 (82.1)	196 (78.4)	
5-Minute Apgar score			0.002
0 - 3	5 (0.7)	7 (2.8)	
4 - 6	12 (1.6)	10 (4)	
≥ 7	733 (97.7)	233 (93.2)	
Fetal distress			0.011
Yes	12 (1.6)	11 (4.4)	
No	738 (98.4)	239 (95.6)	
Meconium passage			< 0.001
Yes	12 (1.6)	20 (8)	
No	738 (98.4)	230 (92)	
Meconium aspiration			< 0.001
Yes	7 (0.9)	14 (5.6)	
No	743 (99.1)	236 (94.4)	
NICU admission			< 0.001
Yes	12 (1.6)	10 (4)	
No	738 (98.4)	240 (96)	
Postpartum hemorrhage			0.314
Yes	20 (2.66)	7 (2.8)	
No	730 (97.34)	243 (97.2)	
Maternal infection			< 0.001
Yes	25 (3.33)	30 (12)	
No	725 (96.67)	220 (88)	
Cesarean section			< 0.001
Yes	102 (13.6)	62 (24.8)	
No	648 (86.4)	188 (75.2)	

[a] Values are expressed as mean ± SD or No. (%).

Table 3. Baseline and Demographic Characteristics in Groups 1 and 3 of the Study[a]

	38 - 40 Weeks of Gestation (n = 750)	Above 41 Weeks of Gestation (n = 180)	P Value
Age, y	27.06 ± 5.73	27.41 ± 5.39	0.451
Birth weight, g	3398.13 ± 619.84	3421.11 ± 554.63	0.649
Parity			0.412
1	382 (50.9)	92 (51.1)	
≥ 2	368 (49.1)	88 (48.9)	
Birth weight ≥ 4000 g			0.829
Yes	147 (19.6)	34 (18.9)	
No	603 (80.4)	146 (81.1)	
1-Minute Apgar score			0.006
0 - 3	18 (2.4)	11 (6.1)	
4 - 6	116 (15.5)	37 (20.6)	
≥ 7	616 (82.1)	132 (73.3)	
5-Minute Apgar score			< 0.001
0 - 3	5 (0.7)	6 (3.3)	
4 - 6	12 (1.6)	13 (7.2)	
≥ 7	733 (97.7)	161 (89.4)	
Fetal distress			< 0.001
Yes	12 (1.6)	19 (10.6)	
No	738 (98.4)	161 (89.4)	
Meconium passage			< 0.001
Yes	12 (1.6)	25 (13.9)	
No	738 (98.4)	155 (86.1)	
Meconium aspiration			< 0.001
Yes	7 (0.9)	18 (10)	
No	743 (99.1)	162 (90)	
NICU admission			< 0.001
Yes	12 (1.6)	12(6.66)	
No	738 (98.4)	168 (93.34)	
Postpartum hemorrhage			0.254
Yes	20 (2.66)	5 (2.77)	
No	730 (97.34)	175 (97.23)	
Maternal infection			< 0.001
Yes	25 (3.33)	28 (15.55)	
No	725 (96.67)	152 (84.45)	
Cesarean section			< 0.001
Yes	102 (13.6)	60 (33.3)	
No	648 (86.4)	120 (66.7)	

[a] Values are expressed as mean ± SD or No. (%).

turity syndrome, and fetal distress than the patients managed with antepartum fetal testing (15-17).

Mishanina et al. presented benefits for the fetus and no increased risk of maternal death among females with induced labor than the ones with managed expectantly in term and postterm gestations (19).

The results of the current study were similar to those of the following studies.

Gulmezoglu et al. showed that the risk of prenatal mortality was lower in pregnancy termination at 41 to 42 weeks of gestation than with expectant management, but did not achieve statistical significance (15). Fortunately, the current study did not have prenatal mortality.

Also, Caughey et al. suggested that females who were expectantly managed were more likely to have meconium-stained amniotic fluid than the ones who were electively induced (17). Similarly in the current study, the rate of meconium-stained amniotic fluid was higher in mothers > 40 weeks compared with that of the ones with less than 40 weeks of gestation.

Table 4. Baseline and Demographic Characteristics in Groups 2 and 3 of the Study[a]

	40 - 41 Weeks of Gestation (n = 250)	Above 41 Weeks of Gestation (n = 180)	P Value
Age, y	27.50 ± 5.34	27.41 ± 5.39	0.874
Birth weight, g	3433.00 ± 542.88	3421.11 ± 554.63	0.824
Parity			0.584
1	128 (51.2)	92 (51.1)	
≥ 2	122 (48.8)	88 (48.9)	
Birth weight ≥ 4000 g			0.774
Yes	50 (20)	34 (18.9)	
No	200 (80)	146 (81.1)	
1-Minute Apgar score			0.474
0 - 3	12 (4.8)	11 (6.1)	
4 - 6	42 (16.8)	37 (20.6)	
≥ 7	196 (78.4)	132 (73.3)	
5-Minute Apgar score			0.318
0 - 3	7 (2.8)	6 (3.3)	
4 - 6	10 (4)	13 (7.2)	
≥ 7	233 (93.2)	161 (89.4)	
Fetal distress			0.013
Yes	11 (4.4)	19 (10.6)	
No	239 (95.6)	161 (89.4)	
Meconium passage			0.049
Yes	20 (8)	25 (13.9)	
No	230 (92)	125 (86.1)	
Meconium aspiration			0.041
Yes	14 (5.6)	18 (10)	
No	236 (94.4)	162 (90)	
NICU admission			
Yes	10 (4)	12 (6.66)	0.612
No	240 (96)	168 (93.34)	
Postpartum hemorrhage			0.387
Yes	7 (2.8)	5 (2.77)	
No	243 (97.2)	175 (97.23)	
Maternal infection			0.213
Yes	30 (12)	28 (15.55)	
No	220 (88)	152 (84.45)	
Cesarean section			0.053
Yes	62 (24.8)	60 (33.3)	
No	188 (75.2)	120 (66.7)	

[a] Values are expressed as mean ± SD or No. (%).

But others reported induction of labor at full term in uncomplicated singleton has overall similar outcomes compared to expectant management (14, 19, 20). In addition, meta-analysis did not find a significant difference in NICU admissions between pregnancies induced at 41 weeks of gestation and the ones with managed expectantly (15), which suggest that neonatal morbidity does not rise substantially postterm. There were significant differences in NICU admissions among the 3 groups.

Some researchers reported that the risk of cesarean delivery was lower among females whose labor was induced than among the ones with managed expectantly in term and postterm gestations. There were benefits for the fetus, and no increased risk of maternal death. They presented that the low cesarean rate with earlier gestational age may be due to lower rates of macrosomia and abnormal intrapartum fetal heart rate tracings with earlier delivery (14, 19, 21).

In the current study, the rate of cesarean delivery was lower before 40 weeks of gestation compared with 40 to 41 weeks and also, in 40 to 41 weeks compared with above 41 weeks; the rate of newborn with the weight > 4000 g was similar in the 3 groups, but the rates of fetal distress and meconium passage were significantly different among the 3 groups, and were the cause of increased cesarean section in groups 2 and 3 compared with group 1. In the current study, the rate of fetal distress and meconium passage were similar in group 40 to 41 weeks and the group above 41 weeks; therefore, the rate of cesarean delivery was also similar between the 2 groups.

Also, some researchers reported that the rate of operative vaginal deliveries increased with delivery after 40 weeks, and the higher incidence of 3rd or 4rd degree lacerations, secondary postpartum bleeding, and prolonged labor were observed between 40 and 42 weeks, compared with before 40 weeks of gestation (1, 14, 19).

In contrast, some studies reported no difference in the risk of cesarean delivery among females who delivered at term, compared with females who delivered late-term and postterm (15, 22). Thangarajah et al. reported that induction of labor in late- and postterm pregnancies was associated with a significantly higher cesarean section rate, compared with expectant management (23).

4.1. Conclusions

Results of the current study suggested that prenatal and maternal morbidity and the rate of cesarean sections increased after 40 weeks of gestation, compared with 38 to 40 weeks; therefore, planned early delivery is recommend versus expectant management of term and full term pregnancies.

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