Beyond 40 Weeks: A Comparative Study of Maternal and Neonatal Outcomes in Spontaneous vs Induced Labor

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Article Info

P-ISSN: 3051-3367
E-ISSN: 3051-3375
Volume: 01
Issue: 03
July- September 2025
Received: 07-07-2025
Accepted: 09-08-2025
Published: 02-09-2025
Page No: 01-05

Abstract
Introduction: Pregnancy extending beyond 40 weeks occurs in 2-14% of cases and poses risks to both mother and fetus. Mothers may experience higher rates of induced labor, instrumental deliveries, and cesarean sections with related complications. Fetuses are at risk for issues such as intrauterine growth restriction (IUGR) and macrosomia.
Aim and Objective: To compare maternal and fetal outcome in spontaneous labor and induced labor beyond 40 weeks of gestation.
Material and Methods: It was a hospital based prospective comparative study conducted in the Department of Obstetrics and Gynecology at Dr RPGMC Tanda at Kangra which were include 200 pregnant women who have crossed their expected date of delivery meeting the inclusion and exclusion criteria admitted to labor/obstetrics ward for delivery over a period of 1 year.
Results: We found that Group 1 had a mean age of 27.6 years and Group 2 had 26.93 years. Misoprostol doses were higher in Group 1 (mean 2.90) than in Group 2 (2.34) with a significant difference ($p = 0.001$). Oxytocin use was similar across groups. Intrapartum and neonatal complications were comparable, with Group 2 having more hyperbilirubinemia (15%) and NICU admissions (8%). Maternal complications included similar rates of atonic PPH and surgical site infections in both groups, with higher traumatic PPH and gaped episiotomy in Group 1.
Conclusion: Induction increased cesarean rates but did not raise maternal or neonatal complications. Spontaneous labor had better vaginal delivery rates. Individualized management is essential.

DOI: https://doi.org/10.54660/.IJCOGN.2025.1.3.01-05

Keywords: Postdate Pregnancy, Induction of Labor, Spontaneous Labor, Cesarean Section, Maternal Outcome, Neonatal Outcome

Introduction

Postdate, post-term, post-maturity, and prolonged pregnancy are accepted terms used by the World Health Organization (WHO) and the International Federation of Gynecology and Obstetrics (FIGO) to describe gestation beyond the expected date of delivery. Postdate pregnancy is defined as a pregnancy that has passed 40 completed weeks, while post-term refers to pregnancies exceeding 42 weeks [1]. Prolongation of pregnancy complicates up to 10% of all pregnancies and carries increased risk to both the mother and fetus [2]. Accurate estimation of gestational age is essential for identifying postdated pregnancy, commonly achieved through a reliable last menstrual period (LMP) and first-trimester ultrasound [3].

Risk factors include primiparity, history of post-term pregnancy, male fetus, obesity, and genetic predisposition [4]. Maternal complications of prolonged pregnancy include increased rates of labor induction, cesarean section, instrumental delivery, postpartum hemorrhage, and perineal trauma [5]. Neonatal risks include oligohydramnios, meconium-stained liquor, meconium aspiration syndrome (MAS), macrosomia, shoulder dystocia, neonatal asphyxia, and stillbirth [6, 7]. Studies have shown that the

incidence of MAS increases significantly beyond 40 weeks, with associated adverse neonatal outcomes such as low Apgar scores and NICU admission [8].

Several international trials and systematic reviews have demonstrated that induction of labor beyond 39–41 weeks can reduce perinatal morbidity and mortality without significantly increasing maternal complications [9, 10]. However, protocols vary globally, and no uniform guideline is considered standard. Therefore, institutional protocols and individualized assessment play a critical role in the management of postdated pregnancies.

This study aims to compare maternal and fetal outcomes in spontaneous labor versus induced labor in women presenting beyond 40 weeks of gestation.

Material and Methods

It was a hospital based prospective comparative study conducted in the Department of Obstetrics and Gynecology at Dr RPGMC Tanda at Kangra which were include 200 pregnant women who have crossed their expected date of delivery meeting the inclusion and exclusion criteria admitted to labor/obstetrics ward for delivery over a period of 1 year.

Inclusion Criteria: We included singleton pregnancies beyond 40 weeks up to 42 weeks with confirmed LMP and, if available, a first-trimester scan.

Exclusion Criteria: We excluded premature rupture of membranes, medical conditions (e.g., diabetes, cardiac diseases), previous cesarean section, and other induction methods.

Patients were grouped into two groups:

Group 1 included 100 women beyond 40 weeks who had induced labour with sublingual 25mcg misoprostol given 4 hourly maximum 4 doses. labor beyond 40 weeks. **Group 2** included 100 women beyond 40 weeks who had spontaneous labour.

Methodology

A comprehensive history and examination were conducted to assess pregnancy risks. Vitals, fetal size, lie, and previous uterine surgery scars were checked, along with the Bishop score, pelvis adequacy, and membrane rupture. Basic investigations like hemoglobin and glucose were done. After delivery, patients were monitored for two hours. Labor was managed with CTG, partographs, and oxytocin as needed, with Group B undergoing NST before induction. In the first stage, maternal vitals and fetal heart rate were monitored regularly, labor progress was recorded, and medications and hydration were provided per protocol. Uterine hyperstimulation was managed by adjusting medications, while prostaglandin-induced hyperstimulation and meconium-stained fluid were closely monitored. In the second stage, delivery details and Apgar scores were documented, and the third stage recorded placental details and complications. Postpartum care followed standard protocols for both mother and baby.

Statistical Analysis

Data were recorded in a pre-designed study proforma. Qualitative data were presented as frequency and percentage, with associations assessed using the Chi-square test or Fisher's exact test for 2×2 tables. Quantitative data were represented as mean ± SD.

Results and Observations

In the present study we included 100 women in group 1 and group 2 each. The mean age for Group 1 is 27.6 years and for Group 2, it's 26.93. In Group 1, 66% of patients had a BMI of 18.5-22.9 kg/m², 30% had 23-24.9 kg/m², and 4% had 25-29.9 kg/m². In Group 2, 52% had a BMI of 18.5-22.9 kg/m², 42% had 23-24.9 kg/m², and 6% had 25-29.9 kg/m². The Mean BMI was 22.31 kg/m² in Group 1 and 22.73 kg/m² in Group 2. There was no significant difference seen between two groups in terms of parity, gestational age and booking status.

Table 1: Comparison of cases according to AFI.

AFI (in cm)	Group 1		Group 2	
	No. of Patients	Percentage	No. of Patients	Percentage
<5 cm	1	1	2	2
5-8	20	20	35	35
9-12	77	77	62	62
>12	2	2	1	1
Total	100	100	100	100
Mean ± SD	9.71±1.52		8.9±1.42	
P-Value	<0.0001 (S)			

The table shows AFI distribution for Group 1 and Group 2. In Group 1, 1% had AFI < 5 cm, 20% had 5-8 cm, 77% had 9-12 cm, and 2% had >12 cm. In Group 2, 2% had AFI < 5 cm, 35% had 5-8 cm, 62% had 9-12 cm, and 1% had >12 cm. The mean AFI was 9.71 cm in Group 1 and 8.9 cm in Group 2, with a significant difference between groups ($p < 0.0001$).

In Group 1, 75.93% of primiparous and 76.09% of multiparous women received 1-2 doses of Misoprostol, with mean doses of 2.90 and 2.34, respectively ($p = 0.001$). Oxytocin was administered to 45.45% of primiparous and 54.55% of multiparous women in Group 1, and 41.98% of primiparous and 58.02% of multiparous women in Group 2, with no significant difference ($p = 0.65$).

In the present study, Among primiparous women, 50% experienced labor onset within 0-7 hours and 50% within 8-14 hours. In multiparous women, 60.87% had onset within 0-7 hours and 39.13% within 8-14 hours. The mean induction-to-onset time was 8.15 hours for primiparous and 5.86 hours for multiparous women, with a significant difference between the groups ($p = 0.001$).

Table 2: Comparison of cases according to onset of labor to delivery interval.

Onset of labor to delivery interval	Group 1		Group 2		P-Value
	Mean	SD	Mean	SD	
Primi	6.24	2.94	7.13	2.82	0.10(N.S)
Multi	5.32	2.91	7.71	2.13	<0.0001(S)
Total	5.82	2.95	7.38	2.01	<0.0001(S)

In Group 1, primiparous women had an average of 6.24 hours to delivery, while multiparous women had 5.32 hours. In Group 2, primiparous women averaged 7.13 hours and multiparous women 7.71 hours, with a significant difference for multiparous women ($p < 0.0001$).

We found that Primiparous women had a mean delivery interval of 14.48 hours, with 38.89% in 6-12 hours and 61.11% in 13-24 hours. Multiparous women had a mean of 11.58 hours, with 60.87% in 6-12 hours and 39.13% in 13-24 hours, with a significant difference ($p = 0.0009$).

Table 3: Latent and Active hours in both groups

Parameter	Group 1		Group 2		p-value
	Mean	SD	Mean	SD	
Latent (hrs)	5.55	3.06	5.91	2.93	0.39
Active (hrs)	2.49	1.75	3.11	2.22	0.03

In Group 1, the mean latent phase was 5.55 hours (SD 3.06) and the active phase was 2.49 hours (SD 1.75). In Group 2, the mean latent phase was 5.91 hours (SD 2.93) and the active phase was 3.11 hours (SD 2.22). The active phase difference was significant ($p = 0.03$).

Table 4: Distribution of cases according to mode of delivery

Mode of Delivery	Group 1		Group 2		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	
EMLSCS	33	33	17	17	0.03(S)
Instrumental	9	9	2	2	
Normal Vaginal Delivery	69	69	81	81	
Total	100	100	100	100	

In table 4, Group 1 had 33% EMLSCS, 9% instrumental deliveries, and 69% normal vaginal deliveries. Group 2 had 17% EMLSCS, 2% instrumental deliveries, and 81% normal vaginal deliveries. The difference in EMLSCS rates was significant ($p = 0.03$). In Group 1, failed induction was a significant indication for LSCS (36.36%, $p = 0.004$). Other indications were similar between groups or not significantly different: persistent fetal tachycardia (Group 1: 12.12%, Group 2: 23.53%, $p = 0.3$), thick meconium-stained liquor with abnormal fetal heart rate deceleration (30.30% vs. 29.41%, $p = 0.9$), non-reassuring fetal heart rate (6.06% vs. 23.53%, $p = 0.07$), thick meconium-stained liquor with poor Bishop score (9.09% vs. 17.65%, $p = 0.38$), and non-progress of labor (6.06% vs. 5.88%, $p = 0.97$).

Table 5: Comparison of cases according to neonatal complication

Complication		Group 1		Group 2	
		No. of Patients	Percentage	No. of Patients	Percentage
Intrapartum Complications	MSL in Hind Waters	8	8	8	8
	Non-Reactive NST	0	0	2	2
	None	92	92	90	90
Neonatal complication	Respiratory Distress	9	9	8	8
	Hyperbilirubinemia	8	8	15	15
	NICU Admission	2	2	8	8
Maternal Complications	Not Available	88	88	92	92
	Atonic PPH Uterotonics Given	3	3	3	3
	Traumatic PPH	4	4	1	1
	Gaped Episiotomy	3	3	2	2
	Surgical Site Infection	2	2	2	2

As shown in table 5, Intrapartum complications were similar, with both groups having 8% meconium-stained liquor. Group 2 had 2% non-reactive NST, while Group 1 had none. Neonatal issues included 9% respiratory distress and 8% hyperbilirubinemia in Group 1, compared to 8% and 15% in Group 2, respectively. NICU admissions were 2% in Group 1 and 8% in Group 2. Maternal complications included 88% and 92% of cases with unavailable data in Groups 1 and 2, respectively. Both groups had 3% atonic PPH with uterotonics and 2% surgical site infections. Traumatic PPH was higher in Group 1 (4%) than in Group 2 (1%), and gaped episiotomy was 3% in Group 1 and 2% in Group 2.

Discussion

Pregnancy extending beyond 40 weeks remains a clinical concern due to increased maternal and neonatal risks. Our study demonstrates that induction of labor beyond 40 weeks is associated with a significantly higher rate of cesarean section compared to spontaneous labor (33% vs. 17%, $p = 0.03$). This finding aligns with the results of the ARRIVE trial

and similar studies, which reported increased cesarean rates in induced groups, particularly among nulliparous women with unfavorable Bishop scores [9, 10].

Despite the increased surgical intervention, maternal morbidity—including postpartum hemorrhage, perineal trauma, and surgical site infections—was not significantly different between the two groups, consistent with recent Indian and global studies [11–13]. Neonatal outcomes were also largely comparable, although spontaneous labor was associated with a higher rate of hyperbilirubinemia (15%) and NICU admissions (8%) in our cohort, echoing similar trends reported in studies examining perinatal outcomes in prolonged gestation [12, 14, 15].

Our findings support the growing body of evidence that elective induction of labor at or beyond 39–41 weeks may be safe and, in some settings, beneficial. Large multicenter trials such as INDEX and SWEPIS demonstrated reduced perinatal mortality and morbidity with induction at 41 weeks without increasing cesarean rates [3, 4]. The IPD meta-analysis by Alkmark *et al*. further strengthened this conclusion by pooling patient-level data from multiple randomized trials [4]. Meta-analyses and systematic reviews, including those by Cochrane and the team led by Sotiriadis, have shown that induction of labor in low-risk pregnancies at or beyond 39 weeks can reduce risks such as macrosomia and meconium aspiration syndrome without compromising maternal safety [5, 6]. In our study, the rate of meconium-stained liquor was equal in both groups (8%), supporting these conclusions.

Importantly, the ARRIVE trial's long-term follow-up by Werner *et al*. demonstrated no adverse cognitive or academic outcomes in children following elective induction at 39 weeks, addressing concerns about long-term fetal development [10]. This supports the acceptability of induction in well-dated, low-risk pregnancies.

Indian studies mirror these findings. For instance, Gupta *et al*. and Dagli *et al*. reported similar trends of increased cesarean but without significant differences in neonatal complications [12, 13]. Our use of misoprostol for induction, with a higher dose requirement in primiparous women, mirrors results reported by Dahiya *et al*. and Singh *et al*. [16, 17].

The economic impact of induction versus expectant management has also been evaluated in recent literature. Keulen *et al*. found that induction at 41 weeks may be cost-effective by preventing neonatal complications and operative delivery [18]. Moreover, growing global trends show an increasing acceptance of elective induction beyond 39 weeks, particularly after the ARRIVE trial findings [19].

Overall, our findings highlight that while induction increases cesarean rates, it does not significantly increase adverse outcomes when appropriately selected. Favorable outcomes with spontaneous labor, especially in multiparous women, reinforce the importance of individualized decision-making. Multidisciplinary care, appropriate monitoring, and adherence to evidence-based protocols are essential in managing postdated pregnancies effectively.

Conclusion

Pregnancy beyond term poses management challenges. This study found elective induction is associated with a higher cesarean rate, especially with risk factors like nulliparity and a Bishop score <5. However, elective induction in low-risk populations does not increase risks to mother or baby and does not prolong labor. Group 2 showed better outcomes, highlighting the importance of personalized labor management.

Ethical Considerations

Ethical approval was taken and then study was conducted.

Conflict of Interest

None declared.

Funding

No funding status.

References

1. World Health Organization. WHO recommendations for induction of labour. Geneva: World Health Organization; 2018.
2. Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC. Induction of labour at or beyond 37 weeks. Cochrane Database Syst Rev. 2020;(7):CD004945.
3. Keulen JKJ, Bruinsma A, Kortekaas JC, van Dillen J, Bossuyt PMM, Oudijk MA, *et al*. Induction of labour at 41 weeks versus expectant management until 42 weeks (INDEX): multicentre non-inferiority randomised controlled trial. BMJ. 2019;364:l344.
4. Alkmark M, Keulen JKJ, Kortekaas JC, Bergh C, van Dillen J, Duijnhoven RG, *et al*. Induction of labour at 41 weeks versus expectant management until 42 weeks: individual participant data meta-analysis. PLoS Med. 2020;17(12):e1003436.
5. Wennerholm UB, Saltvedt S, Wessberg A, Alkmark M, Bergh C, Wendel SB, *et al*. Induction of labour at 41 weeks versus expectant management and induction at 42 weeks (SWEPIS): a multicentre, open label, randomised, superiority trial. BMJ. 2019;367:l6131.
6. Sotiriadis A, Petousis S, Thilaganathan B, Figueras F, Martins WP, Odibo AO, *et al*. Elective induction of labor at 39 weeks in uncomplicated singleton pregnancy: a systematic review and meta-analysis. Ultrasound Obstet Gynecol. 2019;53(1):26-35.
7. Saraswat L, Rehan M, Kumari N. Perinatal outcome in pregnancies beyond 40 weeks. Int J Clin Obstet Gynaecol. 2021;5(4):414-8.
8. Chauhan AR, Vasudevan K, Gupta N. Postdated pregnancy and meconium aspiration syndrome risk. Int J Reprod Contracept Obstet Gynecol. 2016;5(1):185-9.
9. Grobman WA, Rice MM, Reddy UM, Tita AT, Silver RM, Miodovnik M, *et al*. Labor induction versus expectant management in low-risk nulliparous women. N Engl J Med. 2018;379(6):513-23.
10. Werner EF, Schlichting LE, Grobman WA, Viner-Brown S, Clark M, Vivier PM. Association of term labor induction versus expectant management with child academic outcomes. JAMA Netw Open. 2020;3(4):e202503.
11. Dagli S, Fonseca M. Maternal and neonatal outcomes in postdated induction versus spontaneous labor. J Obstet Gynaecol India. 2021;71(2):131-5.
12. Gupta M, Shrivastava S, Rai S. Maternal and fetal outcome in pregnancy beyond 40 weeks. Int J Clin Obstet Gynaecol. 2020;4(2):123-9.
13. Patil R, Dave A. Maternal and perinatal outcomes of induction at 40 and 41 weeks. Int J Reprod Contracept Obstet Gynecol. 2016;5(11):2704-8.

14. Singh P, Jain S, Gupta A. Maternal and fetal outcomes in induced versus spontaneous labor post-date. J Evid Based Med Healthc. 2020;7(40):2395-9.
15. Ghosh M, Ghosh A, Ghosh R. Perinatal outcomes in induced versus spontaneous labour post-date. Int J Reprod Contracept Obstet Gynecol. 2018;7(3):859-64.
16. Dahiya P, Sharma R, Nanda S, Kumar S, Sehgal A, Aggarwal A. Dinoprostone versus misoprostol for induction in postdated pregnancy. Int J Reprod Contracept Obstet Gynecol. 2016;5(9):3157-62.
17. Keulen JKJ, van Baaren GJ, van Pampus MG, Kortekaas JC, van Dillen J, van Kaam AH, *et al*. Cost-effectiveness of induction of labour at 41 weeks (INDEX trial). BJOG. 2023;130(5):862-70.
18. Le Monde. Global trends in induction practice after ARRIVE. Le Monde [Internet]. 2024 Oct 24 [cited 2025 Sep 20]. Available from: https://www.lemonde.fr/en/france/article/2024/10/24/inducing-labor-a-growing-practice_6730276_7.html.