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Original Research Article

An observational study on indications and outcomes of induction of labour in a tertiary maternity unit

G. Mohanapriya*, G. Ganitha, Jikki Kalaiselvi, Vijayalakshmi Gnanasekaran

Department of Obstetrics and Gynecology, ACS Medical College and Hospital, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. G. Mohanapriya,
E-mail: mohanarajan0907@gmail.com

ABSTRACT

Background: Induction of labour (IOL) is the artificial initiation of uterine contractions when continuation of pregnancy may increase maternal or fetal risk. Common indications include post-term pregnancy, premature rupture of membranes (PROM), hypertensive disorders of pregnancy, oligohydramnios, and suspected fetal compromise. This study aimed to evaluate the indications for IOL and to assess associated maternal and neonatal outcomes in a tertiary maternity unit.

Methods: This prospective observational study included 172 term women (37-41 weeks) undergoing IOL at ACS Medical College, Chennai, over 8 months, from January to June 2025. Patients with spontaneous labour or prior caesarean were excluded. Maternal demographics, indications, induction methods, labour course, delivery mode, and maternal and neonatal outcomes were recorded.

Results: The mean maternal age was 27.8±4.2 years, with 61.6% nulliparous, 99.4% booked, and 0.6% unbooked cases. The main indications for IOL were post-term pregnancy (26.7%), PROM (22.1%), hypertensive disorders (14%), oligohydramnios (10.5%), and foetal compromise/IUGR (5.8%). Misoprostol/PGE_2 gel was used in 60.5%, Foley balloon±oxytocin in 17.4%, and ARM±oxytocin in 22.1% of cases. Spontaneous vaginal delivery occurred in 58.7%, operative vaginal delivery in 4.7%, and caesarean section in 36.6%. Indication for LSCS was primarily due to failed induction (46%) or foetal distress (28.6%). Maternal complications included PPH (9.3%) and hyperstimulation (4.1%). Neonatal outcomes included a mean birth weight 3010±420 g, Apgar <7 at 1 min in 8.1%, NICU admission 12.8%, and perinatal mortality 1.2%.

Conclusions: IOL in this tertiary unit effectively achieved vaginal delivery in most women. Post-term pregnancy, PROM, and hypertensive disorders were common indications. Prostaglandins were mainly used, with minor maternal and neonatal complications.

Keywords: Induction of labour, Caesarean section, Pregnancy, Premature rupture of membranes, Prostaglandins

INTRODUCTION

Induction of labour (IOL) is the planned initiation of uterine contractions before the onset of spontaneous labour when continuation of pregnancy may increase maternal or fetal risk. IOL is a common obstetric intervention aimed at preventing or reducing maternal or foetal complications in various high-risk conditions.[1] In a tertiary care setting, IOL is frequently performed for a range of medical, obstetric, and sometimes elective indications. Observational studies are particularly useful, as they allow the assessment of real-world practices and outcomes without altering clinical care.

Globally, the rates and indications for IOL use vary widely depending on institutional practices, resources, and patient populations. Some common indications include post-term pregnancy, hypertensive disorders of pregnancy, oligohydramnios, premature rupture of membranes (PROM), and foetal growth restriction.[2] In some settings, non-medical or elective reasons (logistic factors, maternal preference) also contribute to IOL decisions.[3] Despite

global data on IOL, there is limited information from our region regarding the patterns of induction, maternal complications, and neonatal outcomes in routine tertiary care facilities. It is important for guiding clinical decisions and optimising both maternal and foetal health. While IOL is intended to improve outcomes, it is not without risk.

Studies have shown that IOL may increase the chances of caesarean section when used without strict indications.[4,5] In a large cohort in South Australia, induction for non-recognised indications was associated with a significantly higher risk of caesarean delivery than spontaneous labour (RR 1.67, 95% CI 1.55-1.80).[4] Similarly, neonatal outcomes such as low Apgar scores, NICU admission, or perinatal morbidity are higher in some settings when induction is compared with spontaneous onset.[6] A recent study examined elective induction vs expectant management in low-risk pregnancies. The ARRIVE trial reported that elective induction at 39 weeks in low-risk first-time mothers can reduce caesarean delivery rates without worsening perinatal outcomes.[7]

A systematic review comparing induction at 39 weeks vs expectant management found that elective induction was associated with lower rates of operative vaginal birth, perineal injury, and low 5-minute Apgar scores.[8] However, many studies focus on selected populations (e.g. low-risk women) or specific outcomes, and less is known about the spectrum of indications and real-world maternal and neonatal outcomes across a broader tertiary maternity setting.[9,10] This indicates a knowledge gap and supports the need for an observational study in our setting to assess IOL indications and related maternal and neonatal outcomes in routine practice, including the benefits and complications. Therefore, this study aimed to evaluate the variety of indications prompting IOL and to analyse the associated maternal and neonatal outcomes. Also, it aimed to determine the prevalence of each indication, compare the rates of normal, operative, and caesarean deliveries among induced women, and assess the complications arising from induction.

METHODS

Study design and setting

This prospective observational study was conducted on 172 pregnant women who underwent labour induction at the Department of Obstetrics and Gynaecology at ACS Medical College and Hospital, Chennai, over a period of 8 months, from January to June 2025. The institutional ethics committee approved the study before its commencement (No.1202/2024/IEC/ACSMCH Dt.04.7.2024). Written informed consent was obtained from all patients before enrolment.

Inclusion and exclusion criteria

All term patients between 37 and 41 weeks of gestation were included. Women with spontaneous onset of labour and those who delivered by caesarean section (term or preterm) were excluded.

Data collection

Data were collected from all women enrolled using a structured proforma. A detailed clinical history was recorded, including maternal age, parity, booking status, gestational age at induction, and presence of associated comorbidities. The specific indication for labour induction was documented in each case, and the method used for induction was noted.

Gestational age was confirmed in all cases before IOL. Maternal outcomes assessed included the overall rate of induction, distribution of various indications, intrapartum complications, mode of delivery with reasons for instrumental or caesarean births, and postpartum complications. The foetal outcomes studied included the occurrence of foetal distress, other perinatal complications, and the requirement for neonatal intensive care unit admission, with duration and indication recorded.

Statistical analysis

All collected data were compiled and entered into Microsoft excel and further analysed using IBM SPSS v22. Continuous variables were presented as mean±standard deviation, and categorical variables as frequencies and percentages. Statistical significance was set at $p<0.05$.

RESULTS

The mean maternal age was 27.8±4.2 years, and the mean gestational age at induction was 40.1±1.0 weeks. Among the patients, 106 (61.6%) were nulliparous and 66 (38.4%) multiparous. The mean BMI was 24.6±3.8 kg/m². Most women were booked, accounting for 171 (99.4%), while 1 (0.6%) were unbooked (Table 1).

Table 1: Maternal characteristics of induced labour patients.

Parameters	Category	N (%)
Maternal age (in years)		27.8±4.2
Parity	Nulliparous	106 (61.6%)
	Multiparous	66 (38.4%)
Gestational age at induction (weeks)		40.1±1.0
BMI (kg/m²)		24.6±3.8
Booking status	Booked	171 (99.4%)
	Unbooked	1 (0.6%)

The most common indication for induction of labour was post-term pregnancy in 46 (26.7%) cases, followed by PROM in 38 (22.1%), hypertensive disorders (PIH/PE) in 24 (14%), oligohydramnios in 18 (10.5%), and IUGR/foetal compromise in 10 (5.8%). Elective/logistic reasons and other conditions (GDM, ICP, BOH, twins) were observed in 18 (10.5%) cases. At admission, 54

(31.4%) women had a Bishop score of <6, while 118 (68.6%) had a score of ≥6 (Table 2).

Table 2: Indications for induction and bishop score at admission.

Parameters	Category	N
Indications for IOL	Post-term	46 (26.7%)
	PROM	38 (22.1%)
	Hypertensive disorders (PIH/PE)	24 (14%)
	Oligohydramnios	18 (10.5%)
	IUGR/Foetal compromise	10 (5.8%)
	Elective/logistic	18 (10.5%)
	Others (GDM, ICP, BOH, twins)	18 (10.5%)
Bishop score at admission	<6	54 (31.4%)
	≥6	118 (68.6%)

Misoprostol/PGE_2 gel was used in 104 (60.5%) cases, foley balloon±oxytocin in 30 (17.4%), and ARM±oxytocin in 38 (22.1%). Oxytocin augmentation was required in 74 (43%) women, whereas 98 (57%) did not require it. Spontaneous vaginal delivery occurred in 101 (58.7%), operative vaginal delivery in eight (4.7%), and caesarean section in 63 (36.6%) women. Among the caesarean cases, the indications included failed induction in 29 (46%), foetal distress in 18 (28.6%), CPD/non-progress in 10 (15.9%), and other reasons in 6 (9.5%) (Table 3).

Table 3: Induction methods, labour augmentation, and delivery outcomes.

Parameters	Category	N
Methods of induction	Misoprostol/PGE_2 gel	104 (60.5%)
	Foley balloon±oxytocin	30 (17.4%)
	ARM±oxytocin	38 (22.1%)
Need for augmentation	Oxytocin required	74 (43%)
	Oxytocin not required	98 (57%)
Mode of delivery	Spontaneous vaginal delivery	101 (58.7%)
	Operative vaginal (forceps/vacuum)	8 (4.7%)
	Caesarean section	63 (36.6%)
Caesarean indications (n=63)	Failed induction	29 (46%)
	Foetal distress	18 (28.6%)
	CPD/non-progress	10 (15.9%)
	Others	6 (9.5%)

Maternal complications included PPH (9.3%), hyperstimulation (4.1%), chorioamnionitis (3.5%), and ICU admission (1.7%). The mean birth weight was 3010±420 g, and 8.1% of neonates had Apgar scores of <7 at 1 min and 4.7% at 5 min. Meconium-stained liquor was noted in 20 (11.6%) cases, resuscitation was required in 12 (7%), NICU admission occurred in 22 (12.8%), and perinatal mortality was 2 (1.2%) (Table 4).

Table 4: Maternal complications and neonatal outcomes.

Parameters	Category	N
Maternal complications	PPH	16 (9.3%)
	Hyperstimulation	7 (4.1%)
	Chorioamnionitis	6 (3.5%)
	Hysterectomy	1 (0.6%)
	ICU admission	3 (1.7%)
Neonatal outcomes	Birth weight (g)	3010±420
	Apgar <7 at 1 min	14 (8.1%)
	Apgar <7 at 5 min	8 (4.7%)
	Meconium-stained liquor	20 (11.6%)
	Resuscitation required	12 (7%)
	NICU admission	22 (12.8%)
	Perinatal mortality	2 (1.2%)

DISCUSSION

Most women were young adults, predominantly nulliparous and booked. Induction was mainly performed at term, and the average BMI was within the normal range. Similar demographic patterns were reported by Thangarajah et al where most women undergoing induction were primiparous, had a normal average BMI, and were induced at late term.[11] Soni et al reported that 67.9% of the induced group were booked cases, while 32.1% were unbooked.[12] This indicates that women undergoing induction of labour are mostly 25-30 years old, primiparous, with normal BMI and regular antenatal care.

The main indications for induction were post-term pregnancy, PROM, hypertensive disorders, oligohydramnios, elective or logistic considerations, and other medical or obstetric factors. On admission, the majority of women had a favourable Bishop score (≥6), while only 31.4% presented with a score <6. Supporting our findings, Sharma et al identified post-term pregnancy as the leading indication for induction, followed by hypertensive disorders of pregnancy and IUGR.[13] Jaiswal et al also found that post-date/post-term pregnancy was the indication for 50% of inductions, followed by hypertensive disorders of pregnancy (31.7%), and they also reported that 73% of women had a favourable Bishop score of 7-10 at the time of induction.[14] Thus, our findings are similar to those of previous studies and suggest that post-term pregnancy is the most common reason for induction.

In our study, labour induction was frequently achieved using prostaglandins, while ARM and the Foley balloon methods were used in 40% of cases. 43% of women required additional oxytocin augmentation to achieve labour. Chuwa et al found that oxytocin was the most frequently used induction method, either alone or

combined with a Foley catheter.[15] Sinha et al reported that Misoprostol (PGE1) alone was used in the majority of cases (71%), with Dinoprostone gel (PGE2) used in 13% of cases and combined methods in 16%.[16] Poornima et al reported that many women induced with prostaglandins still required oxytocin augmentation, indicating that prostaglandins are commonly used for induction, with oxytocin added when needed.

In our study, the majority of women delivered vaginally, while only 4.7% required operative vaginal delivery, and 36.6% underwent caesarean section. The reason for LSCS delivery was failed induction, followed by foetal distress, CPD, and other less common factors. Coinciding with our study, Jaiswal et al reported that 61.7% of induced women delivered vaginally, while 38.3% of induced women underwent a caesarean section.[14] Thangarajah et al found that 53.5% of induced patients delivered spontaneously, while 33.8% in the induction group had a caesarean section.[11] Babu and Manjeera found that the common indications for caesarean deliveries were failed induction (59.7%), foetal distress (17.7%), and secondary arrest of dilatation (11.3%).[18] Nour et al reported foetal distress (49.5%), non-engagement of the foetal head (17.1%), and failure of labour progress (12.1%) as the main reasons.[19] This indicates that while most inductions result in vaginal delivery, a significant number of cases undergo caesarean sections, mostly due to failed induction or foetal distress.

The most frequent maternal complications were postpartum haemorrhage, uterine hyperstimulation, and chorioamnionitis, whereas serious complications such as hysterectomy or ICU admission occurred rarely. The mean birth weight of the neonates was 3010±420 g, and most had normal Apgar scores. Nearly 7-12% of babies experienced meconium-stained liquor, required resuscitation, or needed NICU admission, and only 1.2% of perinatal mortality was observed. Sheth et al observed a PPH rate of 6.5% in the induction group, while Soni et al recorded 20.3% of PPH, 1.97% of chorioamnionitis, 2.28% of hysterectomy and 3.52% of ICU admission.[20,12] Thangarajah et al reported a mean birth weight of 3647±373 g for the induction group, 2.3% of neonates had an Apgar score <7 at five minutes and 6.8% NICU admission rate.[11] Jaiswal et al reported that 99.2% of neonates had an Apgar score of >7 at five minutes, and meconium-stained liquor in 6.7% of neonates.[14] Soni et al reported a perinatal mortality rate of 6.00% in the induced labour group.[12] Maternal and neonatal complications during induction were mostly minor, with serious events being uncommon. Induction of labour appeared effective and safe, with most women achieving vaginal delivery and generally favourable maternal and neonatal outcomes. When caesarean delivery was required, the main reasons were failed induction and fetal distress.

Limitations

This was a single-centre tertiary care study, which may limit generalisability. The observational design and short follow-up also prevented assessment of long-term maternal and neonatal outcomes.

CONCLUSION

Induction of labour in this tertiary maternity unit was effective in achieving vaginal delivery in most women. Post-term pregnancy, PROM, and hypertensive disorders were the leading indications for IOL. Prostaglandins were the most commonly used induction method, and additional oxytocin was required in some cases. Maternal and neonatal complications were generally minor, and serious adverse events were uncommon. Elective induction at the appropriate time contributed to favourable outcomes. With proper selection and monitoring, labour induction is an effective and generally safe intervention in a tertiary maternity setting. Future research should focus on long-term outcomes, optimal induction protocols, and multicentre studies to improve evidence-based guidelines for safer and more effective labour induction.

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