

Induction of Labor and its Maternal and Fetal outcome in a tertiary care centre

¹Dr. R. Payal, Payal Raghuwanshi, Obstetrics and Gynaecology, NOVA IVF, Bhopal, Madhya Pradesh, India.

²Dr. B. Nandini, Obstetrics and Gynaecology, Gandhi Medical College, Bhopal, Madhya Pradesh, India.

³Dr. B. Poorva, Poorva Badkur Obstetrics and Gynaecology, Gandhi Medical College, Bhopal, Madhya Pradesh, India.

Corresponding Author: Dr. B. Nandini, Obstetrics and Gynaecology, Gandhi Medical College, Bhopal, Madhya Pradesh, India.

Citation this Article: Dr. R. Payal, Dr. B. Nandini, Dr. B. Poorva, “Induction of Labor and its Maternal and Fetal outcome in a tertiary care centre”, IJMSIR – August – 2026, Vol – 11, Issue – 4, P. No. 71 – 78.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Induction of labour (IOL) is a common obstetric intervention performed when the benefits of delivery outweigh the risks of continuing pregnancy. The choice of induction method may influence the success of induction, mode of delivery, duration of labour and fetomaternal outcomes. This study was undertaken to evaluate the different methods of induction of labour and their associated maternal and neonatal outcomes.

Methods: This prospective observational study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care hospital from July 2023 to August 2025. A total of 500 Primigravida women with singleton, cephalic pregnancies at 39–42 weeks of gestation who fulfilled the study criteria were enrolled after obtaining informed written consent and institutional ethics committee approval. Women with multiple gestation, mal presentation, previous uterine scar or refusal of consent were excluded. Methods of induction included stripping of membranes, intra cervical Foley’s traction, dinoprostone gel, and combined dinoprostone gel with Foley’s traction. Labour was monitored using cardiotocography and the WHO modified partograph.

Maternal outcomes included mode of delivery, induction-to-delivery interval, hyper stimulation, perineal tears, fever, vomiting, postpartum haemorrhage and blood transfusion. Neonatal outcomes included birth weight, Apgar score, NICU admission, meconium aspiration syndrome, respiratory distress and neonatal death.

Results: Of the 500 women studied, 250 (50.0%) were aged 20.1–25 years and 190 (38.0%) were aged 25.1–30 years. Most inductions were performed between 39 and 40 weeks (66.0%). PROM and hypertensive disorders of pregnancy were present in 40.6% and 35.4% of women, respectively. Dinoprostone gel was the most commonly used method of induction (58.2%), followed by combined dinoprostone gel and Foley’s traction (31.6%). Overall, 365 women (73.0%) achieved vaginal delivery, while 135 (27.0%) underwent LSCS. The mode of delivery differed significantly according to the method of induction ($p=0.0001$). Vaginal delivery was achieved in 75.3% of women induced with dinoprostone gel and in 50.6% of those receiving combined dinoprostone gel and Foley’s traction, while LSCS was required in 21.0% and 22.2%, respectively. The induction-to-delivery interval was 6.1–12 hours in 59.0% of women. Maternal

complications included hyper stimulation (0.8%), perineal tears (1.6%), fever (0.4%), vomiting (0.4%), postpartum haemorrhage (7.0%) and blood transfusion (4.0%). Most neonates (77.0%) weighed 2501–3000 g and 92.0% had an Apgar score ≥ 7 . NICU admission occurred in 9.0%, predominantly due to respiratory distress (46.67%), followed by meconium aspiration syndrome (35.56%). Neonatal death occurred in 2.0% of cases.

Conclusion: Induction of labour resulted in a favourable vaginal delivery rate of 73% in this study. Dinoprostone gel was the most frequently used induction method and was associated with a higher proportion of vaginal deliveries compared with the other methods studied. The method of induction showed a statistically significant association with mode of delivery. Although maternal and neonatal complications were relatively infrequent, careful selection of patients, appropriate choice of induction method and close intrapartum and neonatal monitoring remain essential for achieving favorable fetomaternal outcomes.

Keywords: Induction of Labour; Dinoprostone, Foley's Catheter, Vaginal Delivery, Caesarean Section, Fetomaternal Outcome, Neonatal Outcome.

Introduction

Induction of labor (IOL) is a day to-day practice in obstetrics with the aim of stimulating uterine contractions before the spontaneous onset of labor to achieve a vaginal delivery¹⁻³. Worldwide the percentage of IOL ranges from 9.5% to 33.7% of all pregnancies⁴. The success of induction depends on a variety of maternal factors including her age, period of gestation, obstetric score, indication for induction, any primary or secondary pregnancy or labor complications, fetal lie and presentation, cervical condition, maternal preference and obstetric unit facilities. The process of induction consists

of two primary components: cervical ripening, a biochemical change in the structure and composition (collagen) of cervix followed by uterine stimulation via mechanical/electrical changes in the extracellular matrix^{5,6}. Therapeutic agents like misoprostol (a synthetic prostaglandin E1 analog) and dinoprostone (a naturally occurring prostaglandin E2 analog), promote cervical ripening and labor by enhancing uterine contractility⁷. Mechanical methods (i.e., Foley catheters) cause cervical dilation by exerting direct pressure on the cervix and release of endogenous prostaglandins⁸. While oxytocin's role is to increase intensity of uterine contractions which in turn depends upon the extent of cervical priming done prior to induction⁹.

Success of induction depends largely on the cervical factors which are defined by the modified Bishop's score¹⁰. IOL is indicated when the benefit to either the mother or fetus outweighs that of continuing the pregnancy. Beyond 41 weeks of gestation, induction is associated with a small reduction in perinatal deaths and meconium aspiration syndrome. Induction following premature rupture of membranes (PROM) has been shown to reduce infections in mother and fetus, thus reducing neonatal ICU (NICU) admissions. Other established indications include hypertensive disorders, chorioamnionitis, maternal medical complications, fetal growth restriction, intrauterine death, ante partum hemorrhage and Rh immunization¹¹.

However, all inductions may not be successful and some may develop complications. In nullipara with an unfavorable cervix undergoing labor induction, caesarean delivery rate is more than 40%¹².

The most appropriate method of induction among the various options remains controversial. The various modalities have been shown to differ in their efficiency in achieving adequate progress of labor, successful

vaginal delivery and their risks involved (e.g., uterine tachysystole, infection, and maternal discomfort)¹³. Through our study we aim to choose the best suited induction method tailored to patient's characteristics.

Methodology

This was a prospective observational study which was conducted on a total of 500 Primigravida women with singleton pregnancies in cephalic presentation at 39–42 weeks of gestation admitted in the labour room in Department of Obstetrics and Gynaecology in a tertiary care hospital during study period from July 2023 to August 2025. Informed, written consent was taken from patients along with Institutional ethics committee approval was secured. The labor was induced for either Postdatism, premature rupture of membranes (PROM) or hypertensive disorder of pregnancy (HDP).

Patients with multiple gestation, Malpresentations, previous uterine scar and those who dint consent for the study were excluded. The study participants were recruited from labour room and data was collected from labour room records including maternal age and booking status. Gestational period was calculated according to last menstrual period and confirmed by the first trimester ultrasound with a fetal crown-rump length measurement.

Results

Table 1: Demographic Characteristics.

Variable	Category	Number of Cases (n)	Percentage (%)
Age Group (Years)	≤ 20	60	12.0
	20.1–25	250	50.0
	25.1–30	190	38.0
	Total	500	100.0
Booking Status	Booked	330	66.0
	Unbooked	170	34.0
	Total	500	100.0

Post-date pregnancy was defined as gestational age over 40 + 0 weeks [14].

Methods of Induction Of Labour

- Stripping of membranes
- Intra cervical Foley's traction
- Dinoprostone gel
- Dinoprostone gel and Foley's traction both

Labor monitoring was done using Cardiotocography and WHO modified Partograph. Wherever uterine contractions were inadequate oxytocin infusion was used to augment the labor.

Successful induction is defined as vaginal delivery within 24-48 hours without significant complications¹⁵.

Failed induction is defined when a patient undergoing labor induction fails to progress to the active phase of labor¹⁶.

Other parameters monitored were mode of delivery, incidence of post-partum hemorrhage (atonic or traumatic) and symptoms like diarrhoea, fever and vomiting. The neonatal data collected was birth weight, Apgar score, me conium aspiration and neonatal admissions. After exclusions, 500 women were eligible to be included in the study

Table 2: Indications for Induction, Type of Delivery and Induction-to-Delivery Interval

Outcome / Indication	Category	Number of Cases (n)	Percentage (%)
Gestational Age (Weeks)	39–40	330	66.0
	40.1–42	170	34.0
	Total	500	100.0
Premature Rupture of Membranes (PROM)	Yes	203	40.6
	No	297	59.4
	Total	500	100.0
Hypertensive Disorders of Pregnancy (HDP)	Yes	177	35.4
	No	323	64.6
	Total	500	100.0
Type of Delivery	Vaginal delivery	365	73.0
	Lower Segment Caesarean Section (LSCS)	135	27.0
	Total	500	100.0
Indications for LSCS (n = 135)	Me conium stained liquor (MSL)	44	32.50
	Non-reassuring fetal status	30	22.22
	Failure of induction	61	45.19
	Total	135	100.00
Induction-to-Delivery Interval	≤ 6 hours	135	27.0
	6.1–12 hours	295	59.0
	> 12 hours	70	14.0

Table 3: Method of Induction and Mode of Delivery

Method of Induction	Vaginal Delivery n (%)	Instrumental Delivery n (%)	LSCS n (%)	Total n (%)
Stripping of membranes	6 (14.3)	2 (4.8)	34 (81.0)	42 (100.0)
Foley's traction	3 (33.3)	1 (11.1)	5 (55.6)	9 (100.0)
Dinoprostone gel	219 (75.3)	11 (3.8)	61 (21.0)	291 (100.0)
Dinoprostone gel + Foley's traction	80 (50.6)	43 (27.2)	35 (22.2)	158 (100.0)
Total	308 (61.6)	57 (11.4)	135 (27.0)	500 (100.0)

Table 4: Maternal outcomes

Maternal Outcomes	Number of Cases (n)	Percentage (%)
Hyper stimulation	4	0.8
Perineal tears	8	1.6

Fever	2	0.4
Vomiting	2	0.4
Postpartum hemorrhage	35	7.0
Blood Transfusion	20	4.0

Table 5: Fetal outcomes

Fetal Outcome Category	Category	Number of Cases (n)	Percentage (%)
Birth Weight	< 2500 g	40	8.0
	2501–3000 g	385	77.0
	> 3000 g	75	15.0
	Total	500	100.0
APGAR Score	< 7	40	8.0
	≥ 7	460	92.0
	Total	500	100.0
NICU Admission	Yes	45	9.0
	No	455	91.0
	Total	500	100.0
Indications for NICU Admission (n = 45)	Low birth weight	8	17.78
	Meconium Aspiration Syndrome (MAS)	16	35.56
	Respiratory distress	21	46.67
	Total	45	100.00
Neonatal Death	Yes	10	2.0
	No	490	98.0
	Total	500	100.0

Discussion

IOL is a double-edged sword, offering timely delivery but introducing risks that demand precise monitoring¹⁷. With the rising trends in induction of labor in the last few years use and abuse of induction has become a fierce debate where some studies have suggested that elective induction of labour (the induction of labour in the absence of medical indications) after term gestation is associated with increased obstetric intervention, particularly caesarean delivery. Conversely, when induction of labour is carried out after 37 weeks' gestation in the presence of medical indications such as

gestational hypertension, it reduces the risk of adverse maternal outcomes¹⁷.

In the present study, showing age distribution in the study population amongst which 20.1 to 25 years of age contribute to 50 % followed by 25.1 to 30 years of age (38%) and less than 20 years (12%). These findings were in agreement with the study conducted by Pravati Tripathy et al., in which the women were mostly between 20-25 years of age (47%) followed by 26-30 years (39%)¹⁸.

In our study IOL was done among 330 (66%) of booked patients and 170 (34%) of unhooked patients who were

referred from outside which was similarly seen in study by Osaheni Lucky Lawani (2014) et al ¹⁹.

In our study the gestational age distribution in the study population showed that 39 to 40 weeks contribute to 66 % followed by 40.1 to 42 weeks (34%). These findings correlate well with the study conducted by Pravati Tripathy et al ¹⁸, in which the gestational week at which most of the inductions (84.5%) were conducted was from 39-42 weeks. Amongst which most of the women belongs to 40 to 42 weeks (42.5%) and 39 to <40 weeks (42%). History of PROM and HDP were present in 40.6% and 35.4% of study population respectively.

In the present study, Dinoprostone gel was the most common method of induction (58.2%) followed by Dinoprostone gel and Foleys traction combined (31.6%), Stripping of membranes (8.4%) and Foley's traction (1.8%).

Comparatively, the successful induction rate from this In the present study hyper stimulation, perineal tears was observed in 0.8% and 1.6% respectively whereas PPH was observed in 7% of the study population. Similarly, Abisowo, et, al. ²¹ reported PPH in 4.5% of the study population. However, there were no maternal deaths reported in this study population.

Study was 73% (365) with 27% (135) women undergoing caesarean section after induction of labor. This was also seen in recent study by Doddipatla HM et al ²⁰ but was in contrast with study by P Sharda et al ¹² where caesarean rate was as high as 41%. In our observation, among 42 cases of membrane stripping method of induction, vaginal delivery occurred in 8 cases (19%) and LSCS in 34 cases (81%), in 9 cases of intra cervical Foley's method of induction, vaginal delivery occurred in 4 cases (44.4%) and LSCS in 5 cases (55.6%). In 291 cases where Dinoprostone gel was used as method of induction, delivery through vaginal route

was possible in 230 cases (79%) and caesarean was performed in LSCS in 61 cases (21%). In 158 cases where Dinoprostone gel and intra cervical Foley's traction were used as combined method of induction, normal delivery occurred in 123 cases (77.8%) and LSCS in 35 cases (22.2%) and this difference was statistically significant (p value = 0.0001).

The most common interval of delivery (59%) was between 6 to 12 hours followed by less than 6 hours (27%) and more than 12 hours (14%) which indicates most of the patients delivered within 12 hours of induction. Failure of induction was the most common indication of LSCS (45.19%) followed by me conium stained liquor (32.5%), non-reassuring fetal heart (22.22%). The caesarean section percentage found in our study was 27%. Similarly, in the study conducted by Pravati Tripathy et al. ¹⁸ in which LSCS was indicated most commonly in Foetal distress (23%) followed by Me conium stained liquor (18%).

In the present study hyper stimulation, perineal tears were observed in 0.8% and 1.6% respectively whereas PPH was observed in 7% of the study population. Similarly, Abisowo, et, al.²¹ reported PPH in 4.5% of the study population. However, there were no maternal deaths reported in this study population.

Maximum number of neonates weigh between 2501 to 3000 grams (77%) followed by more than 3000 grams (15%) and less than 2500 grams (8%). Similarly, in the study conducted by Pravati Tripathy et al. ¹⁸ in which most babies had birth weight of >3000 grams (51.50%) and 2500 – 3000 grams (35.50%). In the present study, Me conium aspiration syndrome and NICU admission were observed in 17.4% and 9% of study population respectively. The rate of NICU admissions were 22% and 23% respectively in studies by P sharda et al ¹² and Doddipatla HM et al ²⁰ respectively. The prevalent cause

for NICU admission was respiratory distress followed by meconium aspiration. The APGAR score for most of our newborns was more than 7 while in 8 % it was found to be less than or equal to 7. On the contrary Selo - ojeme et al.²² noted that the rate of adverse neonatal outcome (poor Apgar score) which was higher in their induction group may be related in part to uterine hyper stimulation. Neonatal death was observed in 2 % of study population. Similarly, in the study conducted by Abisowo et al²¹. 4 neonatal deaths were reported among the study population.

Conclusion

Induction of labour resulted in a favourable vaginal delivery rate of 73% in this study. Dinoprostone gel was the most frequently used induction method and was associated with a higher proportion of vaginal deliveries compared with the other methods studied. The method of induction showed a statistically significant association with mode of delivery. Although maternal and neonatal complications were relatively infrequent, careful selection of patients, appropriate choice of induction method and close intrapartum and neonatal monitoring remain essential for achieving favourable fetomaternal outcomes.

References

1. Shields LE, Goffman D, Caughey AB. ACOG practice bulletin: clinical management guidelines for obstetrician-gynecologists. *Obstet Gynecol.* 2017; 130(4): e168-86.2.
2. Landon MB, Galan HL, Jauniaux ERM, Driscoll DA, Berghella V, Grobman WA, Kilpatrick KS, Cahill AG. *Gabbe's Obstetrics: normal and problem pregnancies.* vol. 53. 8th ed. Elsevier; 2013:1689-1699
3. Marconi AM. Recent advances in the induction of labor. *F1000Res.* 2019; 8 (F1000 Faculty Rev):1829.

4. World Health Organization. WHO recommendations: induction of labour at or beyond term, 2018. Available at: <https://iris.who.int/handle/10665/277233>. Accessed 01 May 2024.
5. Jozwiak M, van de Lest HA, Burger NB, Dijksterhuis MG, De Leeuw JW: Cervical ripening with Foley catheter for induction of labor after cesarean section: a cohort study. *Acta Obstet Gynecol Scand.* 2014, 93:296-301. 10.1111/aogs.12320
6. Berezowsky A, Zeevi G, Hadar E, Krispin E: Maternal and perinatal outcomes of failed prostaglandin induction of labour: a retrospective cohort study. *Heliyon.* 2023, 9:13055. 10.1016/j.heliyon.2023.e13055
7. Mancarella M, Costa Torro D, Moggio G, Bounous VE, Biglia N: Induction of labor with repeated prostaglandin administration after failure of dinoprostone vaginal insert: a retrospective study comparing dinoprostone and misoprostol. *Minerva Obstet Gynecol.* 2025, 77:19-26. 10.23736/S2724-606X.23.05414-3
8. Manly E, Hirsch L, Moloney A, et al.: Comparing Foley catheter to prostaglandins for cervical ripening in Multiparous women. *J Obstet Gynaecol Can.* 2020, 42:853-60. 10.1016/j.jogc.2019.11.001
9. Germano C, Mappa I, Cromi A, et al.: Induction of labor in women with previous cesarean section and unfavorable cervix: a retrospective cohort study. *Healthcare (Basel).* 2023, 11:543. 10.3390/healthcare11040543
10. Wormer KC, Bauer A, Williford AE. Bishop Score. [Updated 2022 Sep 5]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2022 Jan.
11. Sawant PP, Chaudhari SN, Hol K, Shastri S. Lustrum study of labour induction. *Int J Reprod Contracept Obstet Gynecol* 2022; 11:2218-22.

12. Sharda P, Agrawal NR. Various modalities of induction of labour and its fetomaternal outcomes: An observational study [Internet]. *Indian J Obstet Gynecol Res.* 2021 [cited 2026 Aug 11]; 8(3):334-338. Available from: <https://doi.org/10.18231/j.ijogr.2021.070>
13. Mlodawski J, Mlodawska M, Armanska J, Swiercz G, Gluszek S: Misoprostol vs dinoprostone vaginal insert in labour induction: comparison of obstetrical outcome. *Sci Rep.* 2021, 11:9077. 10.1038/s41598-021-88723-5
14. Practice bulletin no. 146, Management of late-term and postterm pregnancies, *Obstet. Gynecol.* 124 (2 Pt 1) (2014) 390–396. And indication for induction.
15. Namutosi E, Akankwasa P, Matokota JB, Ssempanyi DD, Katongole J, Kakooza J, Lewis C, Okurut E, Owu DU, Senaji N. Induction of Labor: A Narrative Review for Clinical Use. *Cureus.* 2025 Oct 9;17(10):e94205. doi: 10.7759/cureus.94205. PMID: 41209960; PMCID: PMC12595975.
16. Ayala N, Rouse D Failed induction of labor *American Journal of Obstetrics & Gynecology*, 2022; 230, S769-S774
17. Glantz JC. Elective induction vs. spontaneous labor associations and outcomes. *J Reprod Med* 2005; 50:235-40.
18. Pravati Tripathy, Tapasi Pati, Prasanna Baby, Susanta Kumar Mohapatra, Prevalence and Predictors of Failed Induction, *Int. J. Pharm. Sci. Rev. Res.*, 2016; 39 (2), Pages: 189-194
19. Lawani O, Onyebuchi A, Okafo C, LA. Obstetric outcome and significance of labour induction in a health resource poor setting. *Obstet Gynecol Int.* 2014; 2014. [Google Scholar]
20. Doddipatla Hima Madhuri, Ravi Dali Naga Swetha, Gangaraju Soumini and Usha Prasad (2023); Induction Of Labor And Its Fetomaternal Outcome, *International Journal of Advanced Research (IJAR)*, 11 (01), 1457-1461, ISSN 2320-5407. DOI: <https://doi.org/10.21474/IJAR01/16164>
21. Abisowo OY, Oyinyechi AJ, Olusegun FA, Oyedokun OY, Motunrayo AF, Abimbola OT. Fetomaternal outcome of induced versus spontaneous labour in a Nigerian Tertiary Maternity Unit. *Trop J Obstet Gynaecol* 2017; 34:21-7
22. Selo-Ojeme D, Cathy R, Mohanty A, Zaidi N, Villar R, Shangaris P. Is induced labour in the nullipara associated with more maternal and perinatal morbidity? *Arch Gynecol Obstet* 2010; 10:1671-2.