



## EVALUATION OF ASSOCIATED FACTORS AND OUTCOMES AMONG INDUCED LABOURS IN TERTIARY CARE HOSPITAL OF RAJASTHAN

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### ABSTRACT

**Background:** Induction of labour (IOL) is a commonly performed intervention done when maternal or fetal advantages outweigh the risks of continuing pregnancy. The success of IOL is influenced by several factors.

**Objectives:** To evaluate the factors associated with outcome of induced labour and to assess maternal and neonatal outcomes among women undergoing induction of labour at a tertiary care hospital.

**Methods:** A prospective observational study was conducted in the Department of Obstetrics and Gynaecology at a tertiary care hospital from September 2022 to March 2024. A total of 472 women who underwent induction of labour were enrolled. Several factors affecting the IOL in terms of maternal and neonatal outcomes were analysed.

**Results:** Out of 472 women, 340 (72.0%) achieved vaginal delivery, while 132 (28.0%) underwent lower segment caesarean section (LSCS). Booked antenatal status was significantly associated with vaginal delivery compared with unbooked status (76.5% vs. 61.8%;  $p=0.001$ ). Multigravida had a higher vaginal delivery rate than primigravida (79.5% vs. 54.3%;  $p=0.031$ ). NICU admission was required in 24.6% of neonates.

**Conclusion:** Induction of labour is a safe and effective obstetric intervention with a higher rate of vaginal delivery when undertaken for appropriate indications.

**KEYWORDS:** Induction of Labour, Maternal Outcome, Neonatal Outcome, Vaginal Delivery, Caesarean Section.

### Introduction

Labour is a physiological process characterised by uterine contractions which progressively increase in frequency, duration and intensity. It results in effacement followed by dilatation of cervix and descent of fetus through vagina. Induction of labor (IOL) is an obstetric procedure where medical and surgical methods initiate uterine contractions before the onset of spontaneous labor. It is usually done when there is risk to continuation of pregnancy[1].

It leads to safe delivery, generally done after 28 weeks of gestation, with an intention of favourable maternal and fetal outcome. The methods of inducing labor are varied, involving pharmacological and mechanical approaches, each chosen based on the clinical scenario and patient specific factors like dilation and effacement as assessed by bishops score[2].

Common pharmacological methods include the administration of various prostaglandins, such as misoprostol (PGE1) or dinoprostone (PGE2), which leads to cervical

ripening and stimulation of uterine contractions. Oxytocin is also a widely used method, particularly used for the augmentation of labor after cervical ripening<sup>3</sup>. Mechanical methods are also widely used like stripping of membranes, which includes separation of membranes from the cervix which releases natural prostaglandins and helps in initiating the labor[4,5].

There are various indications for IOL aimed at reducing risk to maternal and fetal health like post term pregnancy, gestational diabetes mellitus, severe pre eclampsia, fetal growth restriction or some other maternal medical disorders. WHO also recommends IOL as a therapeutic option but should be considered only when the risk of continuation of pregnancy surpasses the risks of its termination[6].

Studies have shown that there are many factors which influence the IOL success. This study aims to analyze those factors such as age of the mother, parity status, and status of the cervix (assessed by Bishops score) etc. These factors affect likelihood of a successful vaginal delivery following labor induction[7,8].

## Materials and Methods

It was a prospective observational study conducted in the Obstetrics and Gynecology department of our hospital. This study was conducted on 472 pregnant women in whom induction of labour was done during a study period of September 2022 to March 2024 after taking informed consent. Approval was taken from the Institutional Ethics Committee. Patients with spontaneous labor, admitted for elective cesarean section and who did not consent were excluded.

A complete history was taken involving the demography, period of gestation, parity and if any medical or surgical history including history of previous cesarean section. General physical, systemic and obstetric examination (Per Abdominal and Per Vaginal examination) was done. After assessing the bishop's score, a method for induction of labour was decided like oxytocin infusion, Artificial Rupture of Membranes or dinoprostone gel. Maternal outcome was evaluated by the mode of delivery and fetal outcome by NICU admission after induction of labor.

For statistical analysis, Statistical Package of Social Services version 20 (SPSS 20) had been used. To assess the qualitatively independent data, Pearson Chi square test was used (p value < 0.05 considered as significant).

## Results

Data of 472 patients was collected who were induced at our center and was tabulated. Maternal outcome of IOL was assessed by the number of vaginal deliveries as compared to LSCS and fetal outcome was assessed by NICU (Neonatal intensive care unit) admission of the newborns. Out of 472 patients, 340 (72.03%) delivered vaginally whereas

132 (27.97%) patients underwent LSCS. Table 1 shows the association of various demographic factors and the impact on outcome of induction of labor. When age was analysed as a factor to assess the outcome of induction, vaginal deliveries were found to be more in less than 30 years of age as compared to mothers >30 years of age, (71.5% vs 71.3%), but this difference was not significant statistically (p-value = 0.589) indicating that age does not have a significant impact on outcome of induction.

For unbooked patients, the percentage of vaginal deliveries was lower (61.8%) as compared to booked patients (76.5%), with a higher percentage of LSCS (lower segment cesarean section) (38.2% vs 23.5%) in unbooked patients in comparison to booked patients. The p-value of 0.001 shows a significant difference, indicating that booking status has a substantial impact on the success of induction.

In patients who were induced with gestational age of less than 37 weeks, 55.5% patients delivered vaginally and 44.5% had LSCS as compared to patients >37weeks gestation age where the percentage was 72.6% and 27.4% for vaginal and caesarean delivery respectively. The p-value was 0.112 indicating that the differences observed are not statistically significant, suggesting that gestational age does not affect the outcome of induction.

Multigravida females when induced, had more vaginal deliveries as compared to primigravida (79.5% vs 54.3%) with the p-value of 0.031 showing a statistically significant difference in outcome of induction based on parity. It shows that multigravida patients are more likely to deliver vaginally compared to primigravida patients after induction of labor as shown in Table 1.

Table 2, lists the various indications for induction of labour. The most common indication for IOL was Prelabour Rupture of Membranes (PROM) (40.47%), followed by post-term pregnancy (19.49%) in our study. Other indications were maternal medical conditions like pregnancy induced hypertension (PIH) (14.62%), Gestational diabetes mellitus (GDM) (11.02%), Oligohydramnios (5.08%), antepartum haemorrhage (4.66%), intrahepatic cholestasis of pregnancy (IHCP) (2.97%) and certain fetal factors like fetal growth retardation (FGR) (1.06%) and intrauterine death (IUD) (0.64%).

Table 3, shows the indication of LSCS among the induced patients. Fetal distress was the most common indication for LSCS (49.24%), followed by failure of induction (40.15%) and second stage arrest (10.61%).

Table 4, demonstrates the fetal outcome of induced mothers. 116/472 (24.6%) neonates were admitted to NICU whereas 356/472 (75.4%) did not require NICU. Jaundice was the most common indication (9.5%), followed by respiratory distress (4.2%) for NICU admission.

**Table 1: Association of Demographic Factors with outcome of Induction of Labour (n=472)**

|                   | Total | Vaginal |       | LSCS |       | Total | P value |
|-------------------|-------|---------|-------|------|-------|-------|---------|
| Age Group (years) | 472   | No.     | %     | No.  | %     |       |         |
| <30               | 375   | 268     | 71.5% | 107  | 28.5% | 100%  | 0.589   |
| >30               | 97    | 72      | 74.3% | 25   | 25.7% | 100%  | (NS)    |
| Booking Status    |       |         |       |      |       |       |         |
| Booked            | 328   | 251     | 76.5% | 77   | 23.5% | 100%  | 0.001   |
| Unbooked          | 144   | 89      | 61.8% | 55   | 38.2% | 100%  | (S)     |
| Gestational Age   |       |         |       |      |       |       |         |
| <37 Weeks         | 18    | 10      | 55.5% | 8    | 44.5% | 100%  | 0.112   |
| >37 Weeks         | 454   | 330     | 72.6% | 124  | 27.4% | 100%  | (NS)    |
| Parity            |       |         |       |      |       |       |         |
| Primigravida      | 105   | 48      | 45.7% | 57   | 54.3% | 100%  | 0.031   |
| Multigravida      | 367   | 292     | 79.5% | 75   | 20.5% | 100%  | (S)     |

S= Highly significant (P&lt;0.05) NS= Not significant (P&gt;0.05)

**Table 2: Indications of Induction**

| Indication For Induction          | No of Patients | Percentage |
|-----------------------------------|----------------|------------|
| PROM                              | 191            | 40.47%     |
| Post term                         | 92             | 19.49%     |
| PIH                               | 69             | 14.62%     |
| GDM                               | 52             | 11.02%     |
| Oligohydramnios                   | 24             | 5.08%      |
| Antepartum hemorrhage (abruption) | 22             | 4.66%      |
| IHCP                              | 14             | 2.97%      |
| FGR                               | 5              | 1.06%      |
| IUD                               | 3              | 0.64%      |
| Total                             | 472            | 100        |

**Table 3: Indication Of Lower Segment Cesarean Section (LSCS)**

| Indication           | No of Patients | Percentage |
|----------------------|----------------|------------|
| Fetal distress       | 65             | 49.24%     |
| Failure of Induction | 53             | 40.15%     |
| Second stage arrest  | 14             | 10.61%     |
| Total                | 472            | 100%       |

**Table 4: Neonatal Outcome**

| NICU Admission                | No of Patients (n) | Percentage (%) |
|-------------------------------|--------------------|----------------|
| No                            | 356                | 75.4%          |
| Yes                           | 116                | 24.6%          |
| Indication For NICU Admission |                    |                |
| Jaundice                      | 45                 | 9.5%           |

|                      |    |      |
|----------------------|----|------|
| Sepsis               | 2  | 0.4% |
| Hypoglycemia         | 3  | 0.6% |
| Respiratory distress | 20 | 4.2% |
| Birth asphyxia       | 7  | 1.5% |
| Congenital defects   | 8  | 1.7% |

## Discussion

Labor induction is an obstetric procedure which is done widespread for uterine contractions stimulation prior to spontaneous labor onset[9]. This procedure is employed for various maternal medical indications, including, hypertensive disorders of pregnancy, gestational diabetes mellitus, intrahepatic cholestasis of pregnancy (IHCP), premature rupture of membranes (PROM), post term pregnancy and other maternal or fetal factors that necessitates early delivery. Analysing outcomes of labor induction is crucial for optimizing maternal and neonatal health and ensuring informed decision-making in clinical practice[10].

In Our study, statistically significant difference was not found in the mode of delivery between different age groups, with a p-value of 0.589. Females <30 years of age had 71.5% vaginal deliveries and 28.5% LSCS, while those >30 years had 74.3% vaginal deliveries and 25.7% LSCS. This result contrasts with studies like Walker et al[11], in which higher rates of LSCS was noted in women whose age was  $\geq 35$  years as compared to younger women after IOL. In contrast, Dunn et al[12], found no significant difference in women aged < 35 and  $\geq 35$  years between cesarean delivery rates after labor induction which aligns more with our findings, suggesting that age may not be a strong predictor of induction outcomes.

Among the booked patients in whom induction of labour was done, 76.5% had vaginal deliveries, and 23.5% underwent LSCS. The incidence of LSCS was higher (38.2% vs 23.5%) among unbooked patients in comparison to booked patients ( $P < 0.05$ ). Pandey et al[13], in his study showed that cesarean sections rates were higher (32.7%) in unbooked mothers as compared to booked (22.9%), which is consistent with our findings. Chigbu et al[14], also concluded that unbooked status was affiliated with a higher risk of cesarean delivery, especially in nulliparous women which is similar to our results.

Our study showed higher vaginal delivery trends in patients induced after 37 weeks as compared to those induced less than 37 weeks, although this difference was not statistically significant.

Among primigravida, 45.7% patients delivered vaginally as compared to multigravida (79.5%). and the result was significant statistically (p value <0.05). Similar findings found by study done by Verhoeven et al[15].

The common indications for cesarean section (LSCS) in our study were fetal distress (49.24%), failure of induction (40.15%), and second-stage arrest (10.61%). Gabbay-Benziv et al[16], also reported similar results in their Israeli study, with non-reassuring fetal heart rate accounting for 50% of cesarean deliveries after induction.

There were various indications for IOL among the patients in our study group. The most indication was Prelabour Rupture of Membranes (PROM) (40.47%), followed by post-term pregnancy (19.49%) and pregnancy-Induced Hypertension (PIH) (14.62%). Similar findings were shown by Coates et al[17], in which post-term pregnancy, PROM, and hypertensive disorders were observed as the common indications for induction of labour.

In our study, 24.6% of neonates born to induced mothers required NICU admission post delivery with jaundice and respiratory distress being the most common indications, while 75.4% did not need NICU care. This finding provides important information about the neonatal outcomes following labor induction.

Similar results in a large retrospective cohort study were observed by Souter et al[18], in which 27.9% of neonates born after labor induction required NICU admission.

## Conclusion

This study is a comprehensive overview of various factors influencing the maternal and fetal outcome after induction of labour. Prenatal care plays a crucial role, as evidenced by the higher rate of vaginal deliveries among booked patients, highlighting the importance of early and consistent prenatal care.

As the majority of patients achieved vaginal delivery following induction of labour, induction can be considered a safe and therapeutic option when continuing the pregnancy poses a higher risk as compared to the termination of pregnancy for favourable maternal and fetal outcome. Low incidence in NICU admissions are encouraging but the prevalence of jaundice highlights areas for ongoing improvement.

Overall, these insights can guide clinical practices and healthcare policies to enhance the standard of care for expectant mothers and their newborns, ultimately leading to better health outcomes for both.

## Acknowledgements

None

## Conflict of Interest

None

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