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Original Research Article

Prospective Observational Study of Induction of Labor and Its Fetomaternal Outcomes in a Tertiary Care Hospital

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Abstract

Background: Induction of labor (IOL) is one of the most frequently performed obstetric interventions worldwide. It is undertaken when the benefits of delivery outweigh the risks of continuing pregnancy. Despite its widespread use, concerns remain regarding its impact on maternal and neonatal outcomes. This study was conducted to evaluate the indications for induction of labor and assess the associated fetomaternal outcomes in a tertiary care hospital.

Objectives: To identify the common indications for induction of labor and evaluate maternal and neonatal outcomes following induction.

Methods: A prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Tertiary care Hospital, Erode. Two hundred pregnant women who underwent induction of labor between January and September 2023 were included. Demographic characteristics, obstetric profile, indication for induction, method of induction, induction-to-active phase interval, induction-to-delivery interval, mode of delivery, maternal complications, and neonatal outcomes were recorded. Statistical analysis was performed using SPSS version 22. Chi-square and Kruskal–Wallis tests were applied, and $p<0.05$ was considered statistically significant.

Results: Among 2507 deliveries during the study period, 200 women underwent induction of labor. Most participants belonged to the 21–25 years age group (53.5%) and were primigravida (57.5%). Postdated pregnancy was the commonest indication for induction. Prostaglandin E2 (PGE2) gel was the most frequently employed induction method. Vaginal delivery was achieved in 74% of women, whereas 26% required cesarean section. Fetal distress was the leading indication for cesarean delivery. Maternal morbidity was observed in 11%, while perinatal morbidity occurred in 19% of neonates. Increasing parity was associated with a significantly shorter induction-to-active phase interval and induction-to-delivery interval. Prolonged induction was significantly associated with higher cesarean section rates and postpartum hemorrhage.

Conclusion: Induction of labor is an effective obstetric intervention with a high rate of successful vaginal delivery. Postdated pregnancy remains the leading indication for induction. Prolonged induction duration and combined induction methods were associated with increased maternal morbidity.

Keywords: Induction of labor; Prostaglandin E2; Oxytocin; Amniotomy; Maternal outcome; Neonatal outcome.

Introduction

Induction of labor refers to the artificial initiation of uterine contractions before spontaneous onset of labor with the objective of achieving vaginal delivery [1]. It has become an integral component of modern obstetric practice due to advances in fetal surveillance, improved understanding of labor physiology, and growing concerns regarding adverse outcomes associated with prolonged pregnancies [2-4]. Globally, induction rates have increased steadily over the last two decades. The World Health Organization recommends induction only when there is a clear maternal or fetal indication and when anticipated benefits outweigh potential risks [5-6]. Common indications include postdated pregnancy, hypertensive disorders of pregnancy, gestational diabetes mellitus,

oligohydramnios, fetal growth restriction, and premature rupture of membranes [7-8].

Successful induction depends on multiple factors including cervical favorability, parity, gestational age, fetal condition, and induction method [9]. Although induction improves outcomes in appropriately selected women, it may also be associated with prolonged labor, failed induction, operative delivery, postpartum hemorrhage, and neonatal morbidity [10-12].

Considering the increasing frequency of labor induction and the variability in outcomes reported across different institutions, the present study was undertaken to assess the indications, methods, and fetomaternal outcomes of labor induction in a tertiary care center.

Aim: To evaluate the indications for induction of labor and its fetomaternal outcomes in a tertiary care hospital.

Objectives

Primary Objective: To determine the most common indications for induction of labor.

Secondary Objectives

1. To assess maternal outcomes following induction of labor.
2. To evaluate neonatal outcomes following induction of labor.
3. To analyze factors associated with successful induction.

Materials and Methods

This prospective observational study was conducted in the Department of Obstetrics and Gynaecology of a tertiary care hospital in Erode from January 2023 to September 2023. A total of 200 pregnant women who underwent induction of labor during the study period were included using a convenience sampling technique.

Eligible participants were women aged between 15 and 44 years with singleton pregnancies, reliable menstrual histories, and gestational age confirmed by ultrasonography. Women were included if they had one or more accepted indications for induction of labor, such as preeclampsia, gestational hypertension, gestational diabetes mellitus, postdated pregnancy (>41 weeks), oligohydramnios, intrauterine growth restriction, or premature rupture of membranes.

Women who presented in spontaneous labor, had multiple pregnancies, previous cesarean section or any scarred uterus, placenta previa, vasa previa, abnormal fetal presentation, significant uterine surgery, active genital herpes infection, intrauterine fetal demise, congenital fetal anomalies, or uncertain gestational age were excluded from the study. After obtaining informed consent, detailed clinical and obstetric information was collected, and all participants were followed from the time of induction until delivery and discharge to assess maternal and neonatal outcomes.

Study Procedure: After obtaining informed consent, detailed demographic and obstetric data were collected. General and obstetric examinations were performed. Bishop score assessment was done at admission. Women with Bishop score ≤6 received cervical ripening using intracervical PGE2 gel. Women with favorable cervix underwent amniotomy and oxytocin augmentation. Maternal and fetal monitoring was carried out throughout labor using partograph and fetal heart rate monitoring. Patients were followed until discharge.

Outcome Measures

Primary Outcome: Indications for induction of labor.

Secondary Outcomes

- Mode of delivery.
- Maternal morbidity.
- Neonatal morbidity.
- Induction-to-delivery interval.
- NICU admission.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 22. Continuous variables were expressed as mean ± standard deviation. Categorical variables were expressed as frequencies and percentages. Chi-square test and Kruskal–Wallis test were used for comparison. A p-value <0.05 was considered statistically significant.

Results

A total of 200 women underwent induction of labor during the study period.

Table 1: Baseline Characteristics of Study Population (n=200)

Variable	Frequency	Percentage
Age <20 years	37	18.5
Age 21–25 years	107	53.5
Age 26–30 years	45	22.5
Age >30 years	9	4.5
Primigravida	115	57.5
Gravida 2	57	28.5
Gravida 3	21	10.5
Gravida ≥4	7	3.5

Most women belonged to the 21–25-year age group (53.5%). Primigravida constituted 57.5% of the study population. The majority of induced women were between 21 and 25 years of age, indicating that induction was more common among younger reproductive-age women.

Table 2: Indications for Induction of Labor

Indication	Percentage
Postdated pregnancy	34.0
PROM	18.0
Gestational hypertension	14.0
Preeclampsia	12.0
Oligohydramnios	10.0
Gestational diabetes mellitus	7.0
FGR	5.0

Postdated pregnancy emerged as the leading indication for induction of labor.

Table 3: Mode of Delivery Following Induction

Mode of Delivery	Frequency	Percentage
Vaginal delivery	148	74.0
Cesarean section	52	26.0

A successful vaginal delivery was achieved in nearly three-fourths of induced women. The majority of women achieved vaginal delivery, demonstrating the effectiveness of induction when appropriately selected.

Table 4: Maternal and Neonatal Outcomes

Outcome	Frequency	Percentage
Maternal morbidity	22	11.0
Perinatal morbidity	38	19.0
Perinatal mortality	2	1.0
NICU admission	38	19.0

Maternal morbidity was observed in 11% of women, whereas neonatal morbidity occurred in 19% of neonates. Two perinatal deaths were recorded, both associated with severe fetal growth restriction and oligohydramnios. Postpartum hemorrhage was the commonest maternal complication observed after induction. Low birth weight and prematurity were the major causes of neonatal morbidity and NICU admission.

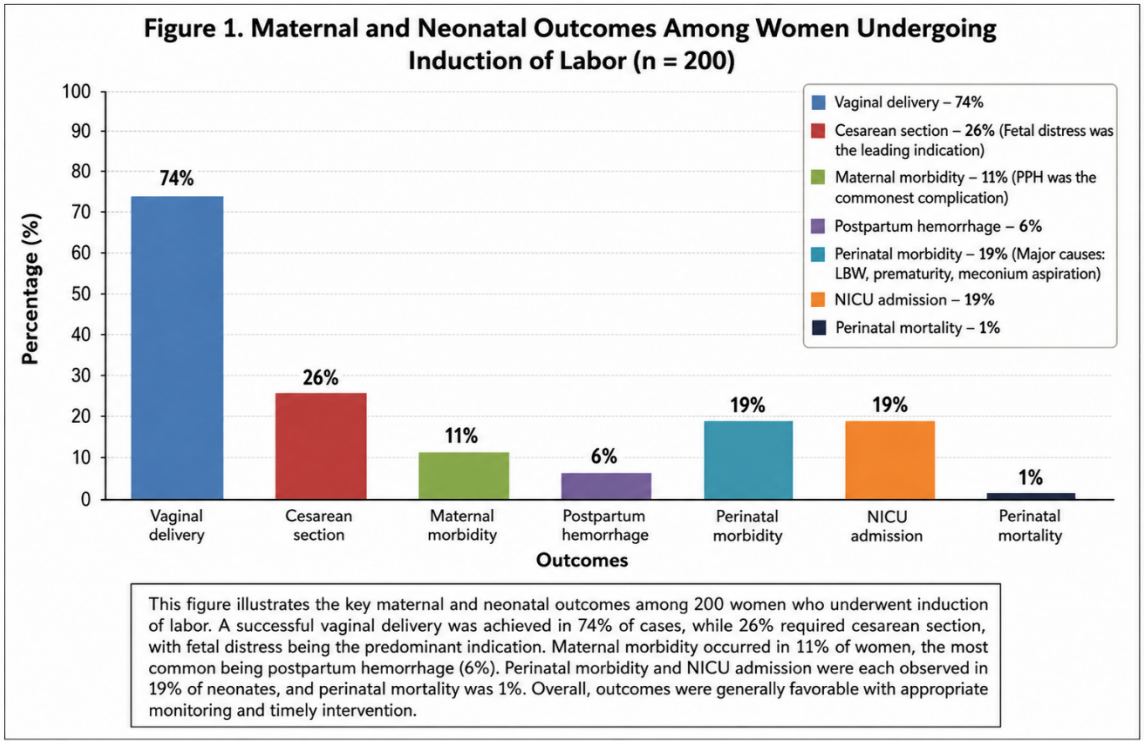

Figure 1: Maternal and Neonatal Outcomes among Women Undergoing Induction of Labor (n = 200)

PPH – Postpartum Hemorrhage; NICU – Neonatal Intensive Care Unit; Perinatal morbidity includes low birth weight, prematurity, respiratory distress, and meconium aspiration syndrome.

This figure summarizes the key maternal and neonatal outcomes following induction of labor. Vaginal delivery was achieved in 74% of women, while 26% required cesarean section. Maternal morbidity occurred in 11% of cases, with postpartum hemorrhage being the most common complication. Perinatal morbidity and NICU admissions were each observed in 19% of neonates, whereas perinatal mortality was low at 1%, indicating generally favorable fetomaternal outcomes following appropriately monitored labor induction.

Discussion

The present study demonstrated that postdated pregnancy was the leading indication for induction of labor. Similar observations were reported by Coates et al. and Rayamajhi et al., who found post-term pregnancy to be the most common indication for induction [13-16]. More than half of the women in the present study were primigravida. This finding is comparable to the observations of Guinn et al., who reported higher induction rates among nulliparous women. Primigravid women are more likely to require induction because spontaneous labor onset is relatively delayed compared to multiparous women [17-18]. The vaginal delivery rate of 74% observed in the present study is comparable to reports by Kim et al., who documented successful vaginal delivery in 57%–70% of induced women. The relatively higher vaginal delivery rate in the present study may be attributable to careful patient selection and favorable cervical ripening protocols [19-20].

Fetal distress was the commonest indication for cesarean delivery among induced women. Similar findings were reported by Seyb et al., who demonstrated increased cesarean section rates among induced women compared to spontaneous labor groups [21-23].

Maternal morbidity was observed in 11% of women, with postpartum hemorrhage being the predominant complication. Prolonged induction-to-delivery interval was significantly associated with increased maternal morbidity. Similar observations have been reported by Stones et al. and Le Ray et al., who demonstrated increased postpartum hemorrhage rates with prolonged labor duration [24]. Perinatal morbidity was observed in 19% of neonates. Low birth weight and prematurity constituted the major causes of NICU admission. No significant association was observed between induction method and neonatal morbidity, indicating that appropriate induction techniques can be safely employed without adversely affecting neonatal outcomes [25].

An important finding of the present study was that increasing parity significantly reduced induction-to-active phase and induction-to-delivery intervals. This highlights the influence of cervical readiness and previous childbirth on induction success.

Conclusion

The present study demonstrated that postdated pregnancy was the most common indication for induction of labor among pregnant women admitted to the tertiary care hospital. Prostaglandin E2 (PGE2) gel emerged as the most frequently employed method for cervical ripening and labor induction.

A successful vaginal delivery was achieved in 74% of the induced women, indicating a high rate of induction success. Among women who required cesarean section, fetal distress was identified as the leading indication. Analysis of labor progression revealed that increasing parity was significantly associated with shorter induction-to-delivery intervals, suggesting a greater likelihood of successful and faster labor among multiparous women.

Maternal morbidity was found to increase with prolonged induction intervals, highlighting the importance of timely labor progression. Furthermore, the combined induction regimen using PGE2 followed by oxytocin was associated with a higher incidence of maternal complications when compared with other induction methods. Overall, neonatal outcomes were favorable, with most newborns exhibiting satisfactory postnatal adaptation and good clinical outcomes when appropriate fetal surveillance and intrapartum monitoring were maintained throughout labor.

Limitations

The present study had several limitations that should be considered while interpreting the findings. First, it was conducted at a single tertiary care center, which may limit the generalizability of the results to other healthcare settings and populations. Second, the study employed a non-randomized observational design, making it susceptible to selection bias and limiting the ability to establish causal relationships between induction methods and outcomes. Third, the absence of a control group consisting of women who underwent spontaneous labor prevented direct comparison of maternal and neonatal outcomes between induced and non-induced pregnancies. Fourth, the relatively limited sample size of 200 participants may have reduced the statistical power to detect less common adverse outcomes and associations. Finally, only selected methods of labor induction, namely PGE2 gel, amniotomy with oxytocin, and PGE2 followed by oxytocin, were evaluated; therefore, the effectiveness and safety of other induction modalities could not be assessed within the scope of this study.

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