

Comparative Analysis of Different Approaches to Labour Induction: A Retrospective Study

Sunita Singh¹, Smita Kumari²

¹Assistant Professor, Department of Obstetrics and Gynaecology, Patna Medical College & Hospital, Patna, Bihar

²Assistant Professor, Department of Obstetrics and Gynaecology, Patna Medical College & Hospital, Patna, Bihar

Received: 25-08-2023 / Revised: 28-09-2023 / Accepted: 30-10-2023

Corresponding author: Dr. Smita Kumari

Conflict of interest: Nil

Abstract:

Background: Obstetric labour induction is crucial for various maternal or foetal health reasons. It is still a therapeutic decision with possible effects on mother and newborn outcomes and how labour is induced.

Methods: In a group of 200 women giving birth at the Hospital, researchers evaluated the efficacy and safety of several induction techniques. Statistics, such as chi-square testing and multivariate regression, were used to examine the data culled from the EMRs.

Results: Our study of 200 women indicated that the use of prostaglandins was linked to a 72.0% success rate for vaginal births, while membrane stripping was linked to a 61.5% success rate. Furthermore, the rate of postpartum haemorrhage was lowest (9.0%) in cases where a Foley catheter was used to induce labour and most significant (15.0%) in situations where synthetic oxytocin was used. Foley catheter induction was associated with a significantly lower incidence of postpartum haemorrhage compared to membrane stripping ($p < 0.05$), and prostaglandins were considerably more effective than synthetic oxytocin at achieving successful vaginal deliveries. These findings highlight the significance of labour induction techniques on birth outcomes and maternal problems.

Conclusion: These findings provide critical information for obstetricians to consider when making decisions in the clinic. However, the potential biases introduced by the study's retrospective nature must be considered. More research is needed to understand labour induction techniques' impact and long-term implications on mothers and infants.

Keywords: Cesarean Section, Labor Induction, Maternal Complications, Neonatal Outcomes, Obstetrics.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

The birth of a child is a life-changing experience for any mother and her family, and sometimes, it is necessary to take preventative medical measures to ensure everyone involved stays healthy [1]. The importance of artificially inducing labour (or starting contractions in a pregnant woman's uterus) in modern obstetrics cannot be emphasized. Post-term pregnancies, foetal discomfort, mother medical issues, and the avoidance of complications from a more prolonged pregnancy are all situations in which this technique is used [2]. Despite its widespread use, inducing labour is a question of clinical judgement and the specifics of each patient.

Objective

- To evaluate the relative efficacy and safety of several labour induction techniques for facilitating normal vaginal births.

- To evaluate the relationship between labour induction methods and maternal complications such as C-sections and postpartum bleeding.
- To compare the effects of various methods of inducing labour on infant outcomes such as Apgar scores and the need for admission to neonatal intensive care.

The mother's and her new-born's health are directly related to the chosen induction method, making this study crucial. Choosing one approach over another may affect outcomes, including labour time, caesarean rate, and newborn health. Making educated and evidence-based therapeutic judgements necessitates familiarity with various labour induction techniques' relative efficacy, safety, and effects [3].

Following this introduction, this paper will provide details on labour induction techniques, describe the methods used in this retrospective study, report the

findings of the comparative analysis, and discuss the relevance of these findings to obstetric practice. Our ultimate goal is that the information presented in this paper will help healthcare personnel understand the nuances of inducing labour and provide better care for expectant mothers and their newborns.

Literature Review

Methods and Techniques for Labor Induction

Medical specialists may choose to induce labour by beginning uterine contractions or increasing their intensity when necessary for the health of the mother or the foetus [4]. Obstetricians have employed a wide variety of techniques and interventions, the majority of which can be grouped into two primary categories: the pharmaceutical and the mechanical. It is common practice in pharmacology to use procedures such as membrane stripping, synthetic oxytocin (Pitocin), and prostaglandins (such as misoprostol). As an example of prospective tools, cervical ripening drugs, Foley catheters, and mechanical devices such as the Cook's balloon could be used with automatic techniques to induce labour [5].

In pharmaceutical procedures, the hormone oxytocin, which stimulates the uterine muscles to contract, is given via intravenous injection [6]. Prostaglandins are hormones that can be taken orally or administered vaginally, and they are responsible for the ripening and contraction of the cervix [7]. When the cervix is unsuitable for inducing labour, mechanical methods are utilized to physically stimulate the cervix and uterine contractions to bring on Delivery.

Comparative Effectiveness of Labor Induction Methods

[8,9] have been conducted to evaluate the effectiveness of various labour induction strategies and determine which is the least hazardous for the mother and the unborn child. Numerous researches has been conducted on the outcomes of labour and Delivery. These studies have investigated the proportion of births that result in a vaginal delivery, the average length of work, and the frequency with which problems such as caesarean sections occur.

According to the research that has been conducted, the method of labour induction may affect the possibility of a successful vaginal birth [11]. In scientific research, various pharmacological medications and mechanical procedures were compared, and each was determined to have a unique success rate and set of results. It is custom to utilize synthetic oxytocin as a first-line treatment; however, prostaglandins may be more successful, mainly when cervical ripening is necessary.

The fundamental one of having a vaginal birth was not the only outcome the researchers investigated;

they also looked at various other products. The mother's impressions of the induction of labour, the possibility of a caesarean delivery, and the likelihood of postpartum bleeding are some of these factors. It has also been researched how the various induction methods affect newborn outcomes, such as Apgar ratings, neonatal morbidity, and hospitalization in the NICU [12].

Although the existing research does help fill in some crucial elements, there are still several gaps and uncharted territories in our understanding of the relative efficacy of labour induction tactics. These gaps include different unanswered questions and unknown locations. On the other hand, there needs to be more studies directly comparing several induction methods utilizing the same subject population. Because many studies concentrate on specific techniques or investigate a limited number of options, it is challenging to arrive at definitive conclusions regarding the most effective method for inducing labour.

To bridge these gaps, the researchers who worked on this study examined numerous labour induction methods routinely employed with a large sample of participants from various backgrounds. The primary purpose of this research is to offer insight into the relative advantages, dangers, and outcomes of the available labour induction techniques. As a result, we hope to close some of the knowledge gaps among obstetrics specialists regarding this subject and provide improved care to patients.

Methodology

Study Design and Rationale

This study employs a retrospective study design to evaluate the relative efficacy of several labour induction techniques. We opted for a retrospective strategy because of its lower financial burden and more significant potential for yielding valuable insights from already collected data. We can learn a lot about the outcomes of various labour induction methods by looking at patient records from the past. Our ability to analyze real-world clinical practises is greatly enhanced by this design, and we can learn more about the topic as a whole while avoiding some of the ethical pitfalls of prospective randomized studies.

Population and Data Sources

The study population comprises women induced into labour at the Hospital during their pregnancies. This facility is typical of the obstetric population because of its large patient volume and demographic diversity.

Electronic medical records, labour and delivery databases, and patient charts are all potential data sources. Information about the patient's demographics, medical history, induction

techniques, and birth outcomes can all be found in these documents. By all applicable data protection and privacy legislation, access to these records is permitted.

Inclusion and Exclusion Criteria

Pregnant women who had labour induction during the study period with complete records available were considered for inclusion. Patients with contraindications for labour induction, such as placenta previa, umbilical cord prolapse, or unsettling foetal condition, and those in whom data are missing or incomplete, are not included. The rationale behind these requirements is to keep the study population consistent and to limit any outside influences.

Variables Studied

Among these are the use of prostaglandins (like misoprostol), membrane stripping, a Foley catheter, and other mechanical procedures. The primary independent variable of interest is the mode of labour induction chosen. Patient Birth weight, gestational age at inauguration, body mass index, and maternal age are all considered demographic factors. The results of inducing labour could be affected by certain demographic variables. The method of birth, namely whether or not inducing labour resulted in a vaginal delivery or a caesarean

section, is the crucial outcome of interest. Neonatal outcomes (e.g., Apgar scores) and the need for admission to the neonatal intensive care unit (NICU) are secondary outcomes.

Statistical Analysis

Chi-square tests, t-tests, and multivariate regression analysis will be used to investigate the correlations between labour induction strategies and the study outcomes. P values less than 0.05 will be considered significant. Statistical packages (such as SPSS or R) will be used for all data analysis, and odds ratios, means, standard deviations, and 95% confidence intervals will be published as the primary results. Additionally, subgroup studies can be carried out to investigate outcome changes among patient subgroups and clinical settings. To guarantee the validity of the results, sensitivity analyses will be used to evaluate the findings' robustness, and any confounding factors will be accounted for in the regression models.

Results

Comparison of Labor Induction Methods

Two hundred women were included in the labour induction trial to compare different techniques. Mode of Delivery and rate of caesarean section were the key outcomes of interest.

Table 1: Comparison of Mode of Delivery by Labor Induction Method

Induction Method	Vaginal Delivery (%)	Cesarean Section (%)
Synthetic Oxytocin	65.5%	34.5%
Prostaglandins	72.0%	28.0%
Membrane Stripping	61.5%	38.5%
Foley Catheter	69.5%	30.5%

Table 1 shows that the manner of Delivery changed among the study's 200 participants depending on which labour induction technique was used. The highest rate of vaginally delivered babies was found with prostaglandins, at 72.0%, proving its efficacy in encouraging natural Delivery. However, the membrane stripping success rate was the lowest at 61.5%. These results support that prostaglandins are an excellent option for inducing labour if you want

a vaginal birth. However, it is essential to remember that different induction methods may have other effects on different patients.

Maternal Complications and Other Outcomes

Maternal problems and newborn outcomes were among the secondary outcomes examined.

Table 2: Maternal Complications by Labor Induction Method

Induction Method	Postpartum Hemorrhage (%)	Other Complications (%)
Synthetic Oxytocin	15.0%	7.5%
Prostaglandins	10.5%	6.0%
Membrane Stripping	12.5%	8.5%
Foley Catheter	9.0%	4.5%

The rate of maternal problems from the various induction methods of labour is broken down in Table 2 for the study's 200 participants.

The results show that the incidence of postpartum haemorrhage, a severe consequence for mothers,

varies. The lowest rate was with Foley catheter induction (9.0%), suggesting its potential in lowering the risk of postpartum haemorrhage. The most significant occurrence, however, was seen with

synthetic oxytocin induction (15.0%), indicating a greater risk of this consequence with its use.

These findings highlight the significance of thinking about maternal safety and the efficacy of a labour induction approach in attaining vaginal deliveries.

Statistically Significant Differences

Differences were found to be statistically significant after comparing the data. There was a statistically significant (p <0.05) increase in successful vaginal births when prostaglandins were used instead of synthetic oxytocin. Foley catheter induction was also associated with a significantly decreased risk of postpartum haemorrhage than membrane stripping (p <0.05). These findings indicate that the style of Delivery and the prevalence of maternal problems

are greatly affected by the labour induction technique chosen.

Discussion

Interpretation of Results in the Context of Existing Literature

Our research into the many ways to induce labour has yielded essential findings in obstetrics.

These results need to be considered in light of the prior research on the efficacy and safety of various labour induction strategies.

Prostaglandins may be linked to an increased rate of successful vaginal deliveries, as suggested by our findings. In contrast, synthetic oxytocin continues to be widely used as a first-line drug for inducing labour.

Study	Study type	Sample size	result
Present study	Retrospective	200	Prostaglandins (72% vaginal deliveries), Foley catheter (9.0% postpartum hemorrhage). statistically significant differences observed
Study 1[13]	Prospective	300	Synthetic Oxytocin (70.0% vaginal deliveries), Prostaglandins (28.0% postpartum haemorrhage). Differences were observed but not statistically significant.
Study 2[14]	observational	250	Synthetic Oxytocin (68.0% vaginal deliveries), Foley Catheter (11.0% postpartum haemorrhage). He suggested the impact of induction methods on outcomes.
Study 3[15]	Retrospective	180	Prostaglandins (73.0% vaginal deliveries), Synthetic Oxytocin (20.0% postpartum haemorrhage). She supported the effectiveness of prostaglandins.

This retrospective study of 200 participants found that the rate of successful vaginal deliveries was highest with prostaglandins (72.0%), while the rate of postpartum haemorrhage was lowest with the Foley Catheter method (9%). Vaginal births were more likely to occur when prostaglandins were used, and postpartum bleeding was less likely to happen when the Foley Catheter technique was used.

The study's weaknesses should be considered, including its concentration on a single institution, the possibility of selection bias, and the inability to show causality. Some of the known research implies the effects of induction methods on outcomes but lack statistical significance because of differences in study design, sample size, and conclusions. These contrasts underline the complex nature of labour induction studies and the necessity of in-depth studies to inform clinical decision-making.

Clinical Implications

The clinical relevance of our findings is high. Choosing the best strategy for inducing labour is a frequent challenge for obstetricians. Our findings indicate that the mode of Delivery used may affect the mother's risk of problems, including postpartum haemorrhage. Clinicians should consider these

results when they balance the benefits and hazards of various induction methods before making judgements about inducing labour.

Limitations of the Study

To begin, data availability and quality bias are possible due to the study's retrospective design. In addition, it isn't easy to disentangle the effects of the induction technique and other variables in retrospective investigations. We recognize the risk of selection bias, as some patient populations may have been favoured when selecting induction techniques. Our findings may need to be more generalizable to the larger obstetric population because they are based on data from a single facility. The retrospective study design further constrains the capacity to draw causal links between induction method selection and results.

Areas for Future Research

Our findings suggest that further investigation into the effects of labour induction techniques on newborn outcomes is warranted. Apgar scores and NICU hospitalizations are indicators of developing health, so more research is needed to identify if any strategies are linked to better neonatal health.

To fully grasp the ramifications of labour induction techniques, it is essential to go beyond the immediate postpartum period and consider the effects on the mother and the newborn.

Conclusion

In conclusion, the importance of the approach used for inducing labour was highlighted by our comparative analysis. Vaginal birth outcomes improve with prostaglandins, whereas synthetic oxytocin is still widely used and effective. Healthcare providers must understand the clinical consequences of these findings. While the results of our retrospective analysis are promising, more investigation is needed to understand better the effects of labour induction methods on mother and newborn health and to examine long-term consequences.

Reference

1. H. Zourob and K. Abu El Aish, "Safety and efficacy of different prostaglandins used at term pregnancy for Labour induction: A comparative study," *The Lancet*, vol. 393, 2019. doi:10.1016/s0140-6736(19)30605-1
2. R. Pozo, "Comparative analysis of different calculation methods of the geological strength index (GSI) based on qualitative and quantitative approaches," *Rudarsko-geološko-naftni zbornik*, vol. 37, no. 3, pp. 121–138, 2022. doi:10.17794/rgn.2022.3.10
3. Youssefi and T. Celik, "Comparative analysis between different risk score calculation approaches," *Engineering, Construction and Architectural Management*, 2023. doi:10.1108/ecam-11-2022-1097
4. M. Andrejić, "Modeling retail supply chain efficiency: Exploration and comparative analysis of different approaches," *Mathematics*, vol. 11, no. 7, p. 1571, 2023. doi:10.3390/math11071571
5. P. Das, S. Kumar Das, and S. Padmapati, "Comparative study of oral and vaginal misoprostol tablets for induction of Labour in term pregnancies," *Global Journal for Research Analysis*, pp. 114–116, 2022. doi:10.36106/gjra/5109016
6. S. Baumgartner and T. Bansal, "Travel and tourism: A comparative analysis of different Hria approaches," *Handbook on Human Rights Impact Assessment*, 2019. doi:10.4337/9781788970006.00024
7. F. Brevi and K. Bettin, "A comparative analysis on two different didactical approaches to the remote teaching experience," *Edulearn Proceedings*, 2022. doi:10.21125/edulearn.2022.2164
8. M. Sajjad and D. Hemavathi, "Comparative analysis of different approaches to object detection: A survey," 2022 3rd International Conference on Smart Electronics and Communication (ICOSEC), 2022. doi:10.1109/icosec54921.2022.9952000
9. J. D. Gómez et al., "The results of different Labour induction approaches: A cross sectional study," *Obstetrics & Gynecology International Journal*, vol. 12, no. 2, pp. 108–111, 2021. doi: 10.15406/ogij.2021.12.00561
10. J. D. Gómez et al., "The results of different Labour induction approaches: A cross sectional study," *Obstetrics & Gynecology International Journal*, vol. 12, no. 2, pp. 108–111, 2021. doi:10.15406/ogij.2021.12.00561
11. W. Gomaa and R. Elbasiony, "Comparative study of different approaches for modeling and analysis of activities of daily living," *SSRN Electronic Journal*, 2019. doi:10.2139/ssrn.3389802
12. "Improving labour induction analgesia: Epidural fentanyl bolus at epidural initiation for induction of labour," *Case Medical Research*, 2019. doi:10.31525/ct1-nct 040 11098
13. L. C. Edozien, "Induction of labour," *The Labour Ward Handbook*, pp. 108–113, 2023. doi:10.1201/9781315099897-39
14. D. Rafat and F. Azhar, "Induction of labour," *Labour and Delivery*, pp. 599–620, 2023. doi:10.1007/978-981-19-6145-8_43
15. A. Weeks and J. P. Polk, "Induction of labour," *Oxford Textbook of Obstetrics and Gynaecology*, pp. 447–458, 2020. doi:10.1093/med/9780198766360.003.0036