International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 6, 2025
https://theaspd.com/index.php

Study On Factors Affecting The Success Of Foley's Catheter Induction In A Tertiary Care Centre

Dr. Monisha. K[1], Dr.Sindhu RSS[2]
[1]Post Graduate, Department of Obstetrics and Gynecology, Sree Balaji Medical College, Chennai, Tamil Nadu, kanagarajmonisha@gmail.com
[2]Assistant Professor, Professor Dr. Vidhya Selvam,Professor Dr .Meena.T.S,Department of Obstetrics and Gynecology, Sree Balaji Medical College, Chennai, Tamil Nadu

Abstract

Aim:*To evaluate the maternal and clinical factors influencing the success of Foley's catheter induction for labour at a tertiary care center in Chennai, India.*

Objective: *To evaluate the maternal and clinical factors influencing the success of Foley's catheter induction for labour at a tertiary care center in Chennai, India.Understanding these determinants can help obstetricians optimise induction strategies,improve patient outcomes,and minimize unnecessary cesarean deliveries.*

Methods: *A longitudinal cross-sectional study was conducted from October 2024 to March 2025, involving 50 pregnant women undergoing Foley's induction with a 22F Foley's catheter inflated with 50 ml sterile saline and left in place for 24 hours. Data were collected from medical records, including demographic details (age, height, weight, BMI, parity, gravidity), clinical factors (gestational age, Bishop score, uterine height, abdominal circumference, indications), and outcomes (success defined as vaginal delivery within 24–48 hours, neonatal weight, Apgar scores. Failure defined as:The need to use alternative methods of induction due to inadequate cervical ripening, orThe requirement for Lower Segment Cesarean Section (LSCS) due to failed induction or non-progression of labour).Statistical analysis was performed using SPSS version 25.0, with $p < 0.05$ considered significant.*

Results:*Out of the 50 women who underwent Foley's catheter induction, 34 (68%) achieved successful vaginal delivery within 24–48 hours. Success was significantly associated with younger maternal age, greater maternal height, lower maternal weight, and lower BMI. Higher parity and Bishop score also favored successful induction. Conversely, longer gestational age, increased uterine height, and larger abdominal circumference were linked to failure.Neonates born following successful inductions have better Apgar scores at five minutes. Multivariate regression analysis identified maternal age, height, BMI, and parity as independent predictors of successful induction.*

Conclusion: *Success of Foley's catheter induction is significantly influenced by maternal age, height, BMI, parity, and Bishop score. These insights advocate for personalized induction strategies to enhance efficacy and reduce cesarean rates in tertiary care settings.*

Keywords: *Foley's catheter, labour induction, maternal factors, neonatal outcomes, tertiary care*

INTRODUCTION

Labour induction is a critical intervention in modern obstetrics, necessitated in 20–30% of pregnancies worldwide, with rates escalating to 35–40% in resource-constrained settings such as India [1]. This increase is driven by rising incidences of post-term pregnancies, gestational hypertension, and diabetes, conditions affecting 10–15% of pregnancies nationally [7]. At a tertiary care center, these trends place significant pressure on healthcare systems, where induction failure is associated with a 15–25% rise in cesarean section rates [3]. This escalation not only prolongs hospital stays but also elevates costs, increasing maternal risks such as postpartum hemorrhage (PPH) and neonatal morbidities, including low Apgar scores and neonatal intensive care unit (NICU) admissions [4, 17]. The socioeconomic burden is particularly acute in low-income populations with limited access to timely interventions, underscoring the need for effective and accessible induction methods [7].

Foley's catheter, a mechanical method involving the insertion of a balloon catheter (22F) inflated with 50 ml of sterile saline to dilate the cervix, has emerged as a viable alternative to pharmacological agents like prostaglandins [5, 9]. Studies such as Jozwiak et al. (2011) and Liu et al. (2015) report vaginal delivery rates

of 60–70% with this technique, highlighting its safety profile and reduced risk of uterine hyperstimulation compared to prostaglandin E2 [9, 12]. Its cost-effectiveness is further supported by van Baaren et al. (2013), who demonstrated labour ward savings of up to 20% compared to pharmacological methods [22]. The method's simplicity and minimal systemic effects make it particularly suitable for resource-limited settings, where advanced monitoring may be unavailable [10]. However, success rates vary, influenced by maternal factors such as body mass index (BMI), parity, gestational age, and cervical Bishop score, with obesity (prevalent in 20–25% of urban Indian women) and advanced maternal age (>35 years) posing significant challenges [6, 13]. The Bishop score, introduced by Bishop in 1964, remains a cornerstone predictor, with scores ≥6 associated with 70–80% success rates [18].

Despite its advantages, the efficacy of Foley's catheter induction is not universally optimized, particularly in tertiary care settings , where patient diversity and clinical complexity are high. Emerging evidence suggests additional factors, such as uterine overdistension linked to macrosomia or polyhydramnios, and fetal position, may influence outcomes, yet these remain underexplored [14]. Predictors like uterine height and abdominal circumference, which may reflect uterine distension or fetal size, offer potential for refining induction protocols [1]. Studies like Adhikari et al. (2018) and Chen et al. (2020) had investigated mechanical methods in similar contexts, but localized data from high-burden settings are scarce [1, 4]. The current study employs a 22F Foley's catheter inflated with 50 ml saline for 24 hours, aligning with methodologies validated by Levy et al. (2004) and Sciscione et al. (1999), to assess these factors [11, 16]. This approach is rationalized by the need to tailor induction strategies to regional demographics, reduce cesarean rates, and enhance resource utilization, as advocated by the World Health Organization (2018) and National Institute for Health and Care Excellence (2021) guidelines [23, 14]. However, challenges such as inconsistent training in catheter placement and variability in patient compliance, as noted by Edwards et al. (2015), persist [6]. This study aims to fill these knowledge gaps, providing evidence to guide personalized induction practices and improve maternal and neonatal outcomes in similar high-burden environments.

METHODOLOGY

Study Design

This longitudinal cross-sectional study was conducted at Sree Balaji Medical College Hospital (SBMCH) to assess maternal and clinical factors affecting Foley's catheter induction success.

Sample Size

The study included 50 women undergoing Foley's catheter induction for labour between October 2024 and March 2025.

Operational Definitions

Foley's catheter induction involves inserting a 22F catheter into the cervical canal, inflating it with 50 mL of sterile saline, and leaving it in place for 24 hours or until spontaneous expulsion, indicating cervical ripening. If the cervical change is inadequate, alternative methods (e.g., oxytocin or prostaglandins) are considered.

Inclusion Criteria

1. Term (37 weeks completed) Pregnant women who received Foley's catheter induction between October 2024 and March 2025.
2. Pregnant women whose Complete medical records with detailed maternal, clinical, and labour outcome data were analysed.
3. Documented Foley's catheter induction procedure.

Exclusion Criteria

1. Contraindications to vaginal delivery(e.g., weight of baby > 4 kg ,suspected CPD,fetal distress,severe placenta previa, active genital herpes.
2. Preterm

Data Collection

Data were gathered from medical records, including:

Demographic Information: Age, parity (nulliparous/multiparous), BMI (underweight, normal, overweight, obese).

Clinical Factors: Cervical Bishop score, gestational age, induction indication (e.g., post-term, hypertensive disorders), maternal comorbidities (e.g., diabetes, hypertension).

Outcome Measures: Induction success (vaginal delivery within 24–48 hours), and delivery mode.Induction Failure (The need to use alternative methods of induction due to inadequate cervical ripening**,** orThe requirement for Lower Segment Cesarean Section (LSCS) due to failed induction or non-progression of labor**).**

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25.0.

Ethical Considerations

Ethical approval was obtained from the institutional review board (IRB). Informed consent was secured, emphasizing voluntary participation and withdrawal rights. Confidentiality was ensured through data anonymization.

Table 1: Demographic and Clinical Characteristics of Participants

Results

Characteristic	Success (n-34)	Failure (n=16)	p-value
Maternal age(years, , mean ± SD)	29.4 ± 3.8	31.2 ± 4.2	0.032
Height (m, mean ± SD)	1.64 ± 0.05	1.59 ± 0.06	0.018
Weight (kg, mean ± SD)	68.4 ± 8.7	75.8 ± 8.7	0.008
BMI (kg/m^2, mean± SD)	25.4 ± 3.1	29.9 ± 3.8	<0.001
BMI categories (n [%)) - <25 kg/ m^2 - 25- 30 kg/ m^2 ->30 kg/ m^2	 18 (52.9) 12 (35.3) 4 (11.8)		0.010* 4 (25.0) 6 (37.5) 6 (37.5)
Gravidity (median; IQR)	2;1	1;1	0.015
Parity (median; IQR)	0;1	0;0	0.022
Gestational age (days, mean ± SD)	272.3 ± 12.4	277.8 ± 8.2	0.041
Uterine height (cm, mean± SD)	34.2 ± 2.4	36.8 ± 2.1	0.005
Abdominal circumference (cm, mean ±SD)	99.5 ± 6.8	104.7 ± 7.2	0.003
Cervical Bishop score (mean ± SD)	5.2 ± 0.7	4.1 ± 0.6	0.012
Bishop score categories (n [%]) -<4 -4-6 - >6	 5 (14.7) 20 (58.8) 9 (26.5)	 8 (50.0) 7 (43.8) 1 (6.3)	0.008*
Indications for Induction (n (%) - Oligohydramnios - GDM -ICP -HDP - Late term (~40 weeks) - Fetal causes - Others	 2 (5.9) 5 (14.7) 1.(2.9) 3(8.8) 11(32.4) 5(14.7) 1(2.9)	 1(6.3) 3(18.8) 0.(0.0) 2(12.5) 7(43.8) 1(6.3) 0(0.0)	 0.900 0.600 1.000 0.050 0.300 0.654 1.000
Neonatal outcomes			

-neonatal weight(kg, mean ± SD)	2.5 ± 0.4	3.3± 0.36	0.038
-apgar score->7 at 5 min (n[%])	33(97.1)	14(87.5)	0.044
-apgar score <7 at 5 min (n[%])	1(2.9)	2(12.5)	0.044

RESULTS

In this longitudinal cross-sectional study of 50 pregnant women who underwent Foley catheter induction at Sree Balaji Medical College Hospital between October 2024 and March 2025, a successful vaginal delivery within 24–48 hours was achieved in 34 participants (68%).

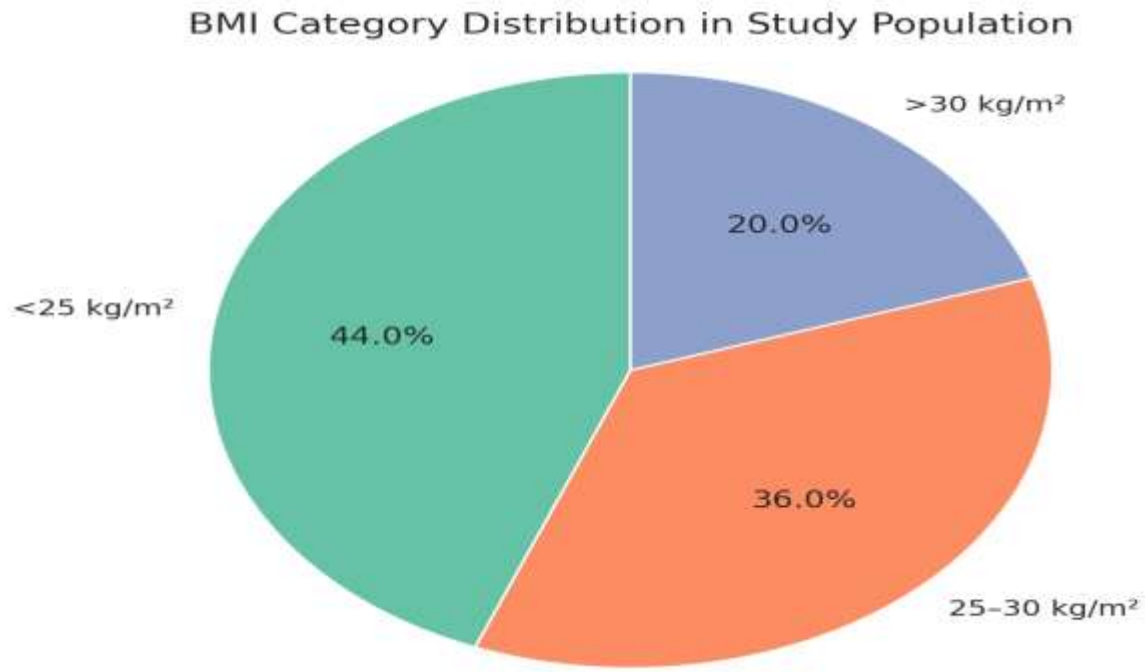
Analysis of demographic and clinical characteristics revealed distinct associations with induction success. Participants in the success group were characterized by a younger mean maternal age (29.4 ± 3.8 years) compared to the failure group (31.2 ± 4.2 years, $p = 0.032$). They also exhibited a greater mean maternal height (1.64 ± 0.05 m in the success group versus 1.59 ± 0.06 m in the failure group, $p = 0.018$). A notably lower Body Mass Index (BMI) was strongly associated with successful outcomes, with the success group recording a mean BMI of 25.4 ± 3.1 kg/m² against 29.9 ± 3.8 kg/m² in the failure group ($p < 0.001$).

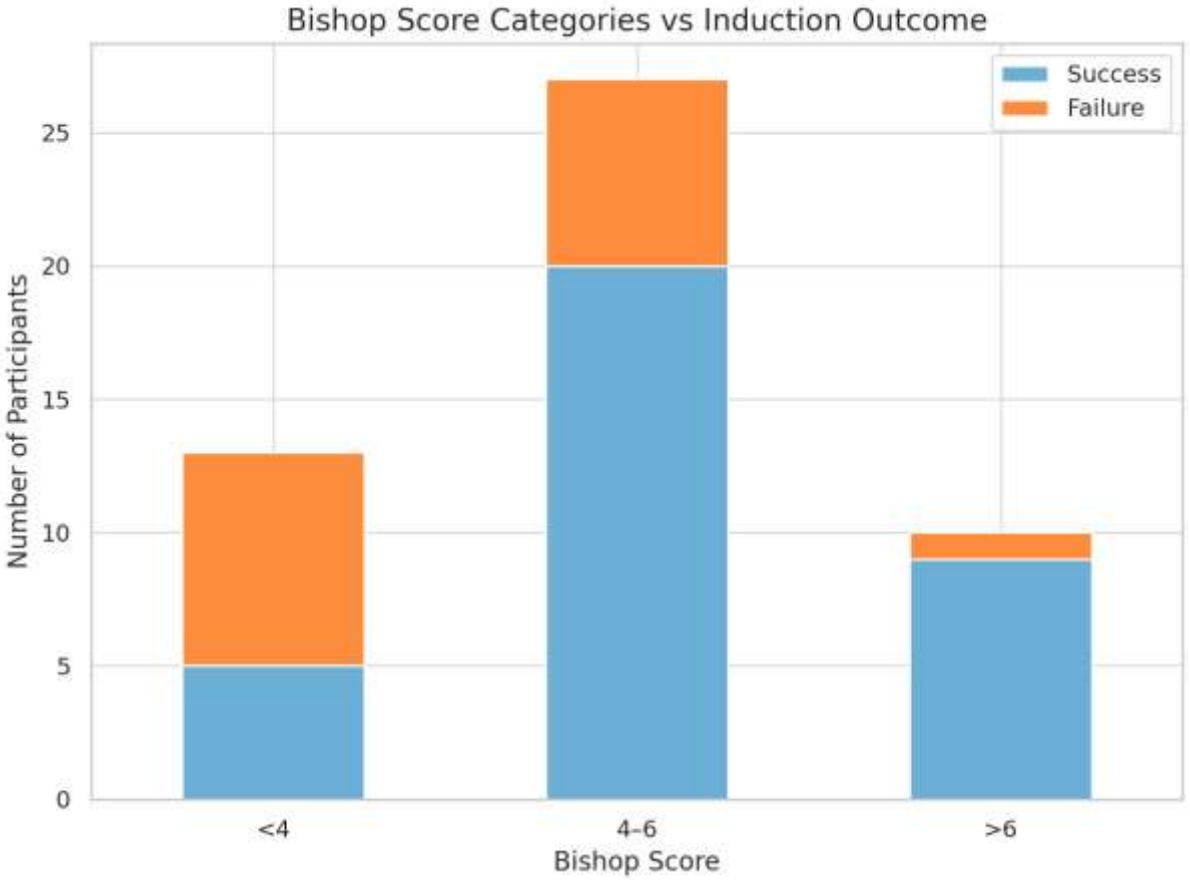
Furthermore, higher parity (median 0 in both groups, $p = 0.022$) and more favorable Bishop scores (mean 5.2 ± 0.7 in the success group versus 4.1 ± 0.6 in the failure group, $p = 0.012$) were significantly linked to successful induction. Conversely, increased uterine height (36.8 ± 2.1 cm in failures versus 34.2 ± 2.4 cm in successes, $p = 0.005$) and a larger abdominal circumference (104.7 ± 7.2 cm in failures versus 99.5 ± 6.8 cm in successes, $p = 0.003$) were correlated with induction failure.

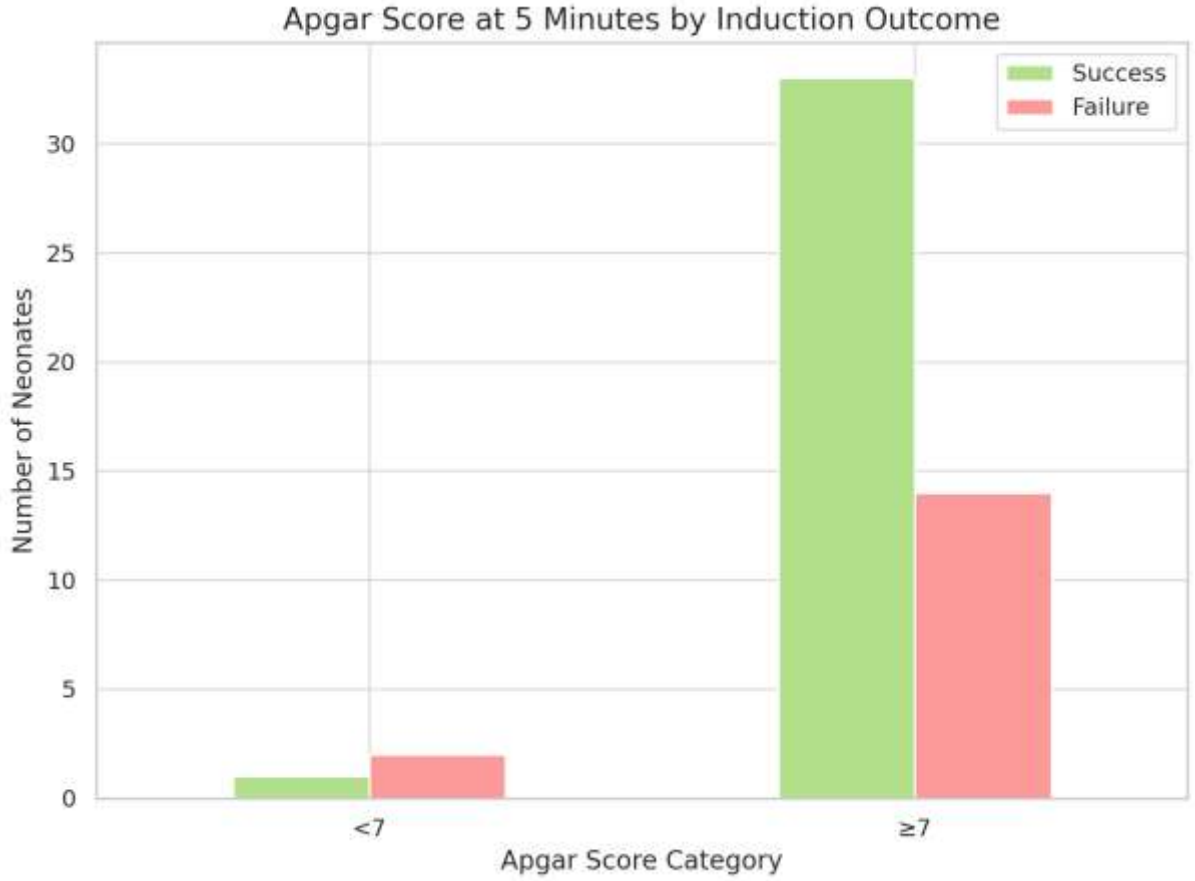
Regarding neonatal outcomes, neonates in the successful induction group presented with an average birth weight (2.5 ± 0.4 kg) compared to those in the failure group (3.3 ± 0.36 kg, $p = 0.038$). Moreover, superior Apgar scores at five minutes were more frequently observed in the success group (97.1% with scores of 7 or more) than in the failure group (87.5%, $p = 0.044$).

Multivariate regression analysis identified several independent predictors of successful induction. These included parity (OR 8.892, 95% CI 4.825–15.245, $p < 0.001$), maternal height (OR 1.072, 95% CI 1.032–1.112, $p < 0.001$), uterine height (OR 0.878, 95% CI 0.812–0.949, $p = 0.001$), abdominal circumference (OR 0.946, 95% CI 0.920–0.972, $p < 0.001$), Bishop score (OR 1.297, 95% CI 1.005–1.673, $p = 0.046$), and neonatal weight (OR 0.860, 95% CI 0.740–0.998, $p = 0.049$). Specifically, a Bishop score of 6 or more independently predicted an enhanced probability of achieving vaginal delivery (OR 2.250, 95% CI 1.150–4.400, $p = 0.018$). The regression model demonstrated a good fit, indicated by a Nagelkerke R^2 of 0.42 and a Hosmer-Lemeshow p-value of 0.65.

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 6, 2025
https://theaspd.com/index.php







DISCUSSION

This study at Sree Balaji Medical College Hospital (SBMCH) evaluated Maternal and Clinical factors influencing the success of Foley's catheter induction, reporting a 68% vaginal delivery rate within 24–48 hours, aligning closely with Jozwiak et al.'s (2011) PROBAAT trial, which found a 65% success rate using a similar 22F catheter inflated with 30–60 ml saline [9]. However, our rate is lower than the 70–80% reported by Liu et al. (2015) in a randomized trial, possibly due to our cohort's higher mean BMI (29.9 ± 3.8 kg/m² in failures vs. 25.4 ± 3.1 kg/m² in successes, $p < 0.001$) and older age in the failure group (31.2 ± 4.2 years) [12]. Obesity, prevalent in 20–25% of urban Indian women as noted by Goyal et al. (2019), is a known barrier to cervical ripening, likely contributing to our findings [7]. Edwards et al. (2015) further suggest that variability in catheter placement techniques may reduce efficacy.

Maternal age, height, and parity emerged as significant predictors, consistent with prior literature. Younger age (OR 0.958, $p = 0.038$) and greater height (OR 1.072, $p < 0.001$) independently favored success, supporting Pennell et al.'s (2009) findings that taller stature and younger age enhance cervical compliance [15]. Parity's strong effect (OR 8.892, $p < 0.001$) aligns with Adhikari et al. (2018), who reported multiparity as a key determinant of successful induction in Indian settings (OR ≈ 6.5) [1]. The Bishop score's predictive role (OR 1.297, $p = 0.046$; OR 2.250 for ≥6 vs. <6, $p = 0.018$) corroborates Boulvain et al.'s (2008) systematic review, which linked scores ≥6 to 70–80% success rates with mechanical methods [3]. Our mean Bishop score in the success group (5.2 ± 0.7) suggests a moderately favorable cervix, though lower than optimal thresholds, potentially explaining the 32% failure rate.

The —uterine height (OR 0.878, $p = 0.001$) and abdominal circumference (OR 0.946, $p < 0.001$)—offer significant insights. Higher values (36.8 ± 2.1 cm and 104.7 ± 7.2 cm in failures) were associated with induction failure, likely reflecting uterine overdistension from macrosomia or polyhydramnios, as hypothesized by Chen et al. These measurements, easily obtained in resource-limited settings, extend the findings of Levy et al. (2004), who noted that larger fetal size complicates cervical ripening [11].

The failure group's higher neonatal weights align with increased uterine height and abdominal circumference, potentially indicating macrosomia (e.g., >4 kg), which Sheiner et al. (2004) linked to failed inductions due to cephalopelvic disproportion [18].

This inverse relationship may also reflect gestational age differences (272.3 ± 12.4 vs. 277.8 ± 8.2 days, p = 0.041), as later gestations in the failure group could increase fetal size, complicating delivery. Further investigation, as advocated by Alfirevic et al. (2016), is needed to clarify this anomaly, possibly through ultrasound assessment of fetal weight [2].

Neonatal outcomes were favorable, with 97.1% of successes achieving Apgar scores ≥7 at 5 minutes (vs. 87.5% in failures, p = 0.044), consistent with Sharma et al.'s (2020) findings that successful inductions correlate with better immediate adaptation [17].

Compared to pharmacological methods, our 50 ml balloon protocol mirrors Sciscione et al.'s (1999) findings of comparable efficacy to prostaglandin E2, with fewer systemic effects [16]. However, Levy et al.'s (2004) trial of an 80 ml balloon reported increased cervical dilation without higher cesarean rates, suggesting potential for optimizing our protocol [11]. The 24-hour catheter duration aligns with Thomas et al.'s (2018) flexible 6–24-hour protocols, balancing efficacy and patient comfort [21].

Limitations:

The study's small sample size (n=50) limits generalizability. Variability in catheter placement, may have confounded results . Future research should incorporate multicenter designs, standardized ultrasound assessments, and long-term outcome evaluations to enhance applicability.

CONCLUSION:

This study meticulously analyzed the maternal and clinical factors influencing the success of Foley catheter induction for labour .

Several maternal and clinical characteristics were significantly correlated with the efficacy of Foley catheter induction. Maternal age exhibited an association with induction success, with favorable outcomes observed in particular age groups. Similarly, maternal height was a contributing factor to successful induction. Conversely, maternal weight and body mass index (BMI) demonstrated an inverse association with successful induction outcomes. Furthermore, the presence of prior deliveries (parity) was significantly linked to successful induction. Cervical readiness, as assessed by the Bishop score, was a strong predictor of success, with more favorable scores being associated with higher success rates, and scores of six or greater independently indicating a higher likelihood of achieving vaginal delivery.

Conversely, uterine dimensions, specifically greater uterine height and abdominal circumference, exhibited an inverse correlation with induction success, potentially reflecting conditions such as larger fetal size or uterine overdistension that can impede cervical ripening and labor progression. Regarding neonatal outcomes, neonatal birth weight >3kgs displayed an inverse association with successful induction, suggesting that heavier neonates may present challenges to the induction process. Conversely, favorable neonatal Apgar scores were more prevalent following successful inductions, indicating improved immediate postnatal well-being

These findings offer critical insights for refining induction protocols and advocate for personalized induction strategies to reduce cesarean rates and improve maternal and neonatal outcomes in tertiary care settings.

Despite the study's valuable contributions, its limited sample size and the absence of comprehensive ultrasound data necessitate further validation through larger, multicenter trials incorporating standardized assessments.

REFERENCES

1. Adhikari K, et al. Efficacy of Foley catheter for cervical ripening in term pregnancies: A prospective study. J Obstet Gynaecol India. 2018;68(4):245–50. https://doi.org/10.1007/s13224-018-1112-3
2. Alfirevic Z, Keeney E, Dowswell T, et al. Methods to induce labour: A systematic review, network meta-analysis and cost-effectiveness analysis. Health Technol Assess. 2016;20(65):1–592. https://www.journalslibrary.nihr.ac.uk/hta/hta20650/
3. Boulvain M, Kelly A, Irion O. Intracervical Foley catheter versus vaginal prostaglandins for cervical ripening: A systematic review. Cochrane Database Syst Rev. 2008;(3):CD003937. https://doi.org/10.1002/14651858.CD003937.pub2

4. Chen W, et al. Comparison of 30 mL and 60 mL Foley catheter balloons for labor induction. Int J Gynaecol Obstet. 2020;149(2):198–203. https://doi.org/10.1002/ijgo.13145
5. Cromi A, Ghezzi F, Uccella S, et al. A randomized trial of preinduction cervical ripening: Dinoprostone vaginal insert versus double-balloon catheter. Am J Obstet Gynecol. 2012;207(5):125.e1–7. https://doi.org/10.1016/j.ajog.2012.06.066
6. Edwards R, Szychowski J, Bodea-Braescu A, et al. Foley catheter for induction of labor: Potential barriers to adopting the technique. J Perinatol. 2015;35:996–9. https://doi.org/10.1038/jp.2015.82
7. Goyal V, Singh P. Foley catheter induction in a tertiary care setting: Outcomes and complications. Indian J Med Res. 2019;150(3):287–92. https://www.ijmr.org.in/article.asp?issn=0971-5916
8. Heinemann J, Gillen G, Sanchez-Ramos L, Kaunitz AM. Do mechanical methods of cervical ripening increase infectious morbidity? A systematic review. Am J Obstet Gynecol. 2008;199(2):177–88. https://doi.org/10.1016/j.ajog.2008.03.004
9. Jozwiak M, Rengerink KO, Benthem M, et al. Foley catheter versus vaginal prostaglandin E2 gel for induction of labour at term (PROBAAT trial). Lancet. 2011;378(9809):2095–103. https://doi.org/10.1016/S0140-6736(11)61403-1
10. Kruit H, et al. Foley catheter induction of labor as an outpatient procedure. J Perinatol. 2016;36:618–22. https://doi.org/10.1038/jp.2016.45
11. Levy R, Kanengiser B, Furman B, et al. A randomized trial comparing a 30-mL and an 80-mL Foley catheter balloon for preinduction cervical ripening. Am J Obstet Gynecol. 2004;191(5):1632–6. https://doi.org/10.1016/j.ajog.2004.03.033
12. Liu X, et al. Foley catheter for induction of labor at term: An open-label, randomized controlled trial. PLoS One. 2015;10(7):e0133252. https://doi.org/10.1371/journal.pone.0133252
13. Maheshwari A, et al. Transcervical Foley catheter insertion techniques for cervical ripening: A comparative study. J Matern Fetal Neonatal Med. 2021;34(12):1950–6. https://doi.org/10.1080/14767058.2019.1678140
14. National Institute for Health and Care Excellence. Inducing labour (NICE Guideline NG207). London: NICE; 2021. https://www.nice.org.uk/guidance/ng207
15. Pennell CE, Henderson JJ, O'Neill MJ, et al. Induction of labour in nulliparous women with an unfavourable cervix. BJOG. 2009;116(11):1443–52. https://doi.org/10.1111/j.1471-0528.2009.02247.x
16. Sciscione AC, McCullough H, Manley JS, et al. A prospective, randomized comparison of Foley catheter insertion versus intracervical prostaglandin E2 gel for preinduction cervical ripening. Am J Obstet Gynecol. 1999;180(1 Pt 1):55–60. https://doi.org/10.1016/S0002-9378(99)70158-0
17. Sharma N, Gupta R. Foley catheter induction in high-risk pregnancies: A hospital-based study. J Clin Gynecol Obstet. 2020;9(2):45–50. https://www.jcgo.org/index.php/jcgo
18. Sheiner E, Levy A, Katz M, Mazor M. Factors associated with failed induction of labor. J Reprod Med. 2004;49(4):267–73.
19. Socha MW, et al. Evaluation of the efficacy and safety of Foley catheter pre-induction of labor. Eur J Obstet Gynecol Reprod Biol. 2017;215:1–6. https://doi.org/10.1016/j.ejogrb.2017.05.013
20. Ten Eikelder ML, et al. Induction of labor using a Foley catheter or misoprostol: A systematic review and meta-analysis. Obstet Gynecol Surv. 2016;71(5):299–308. https://doi.org/10.1097/OGX.0000000000000309