FETO-MATERNAL OUTCOMES IN INDUCED VERSUS SPONTANEOUS ONSET OF LABOR

Zubaida Akhtar, Javeria Khan, Maimoona Qadir, Arzoo Gul Bangash

Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: The objective of our study was to compare the Fetal-Maternal outcomes in induced versus spontaneous onset of labor

Material and methods: This retrospective cohort study was carried out in the Obstetrics and Gynecology department of Khyber Teaching Hospital, Peshawar, from 1st October 2023 to 31st March 2024. Hundred (100) Patients with singleton pregnancy requiring induction of labor were included in Group A, and 100 patients with spontaneous onset of labor were included in Group B. The feto-maternal outcomes in both groups were followed in terms of the type of delivery, ruptured uterus, Post-Partum Hemorrhage, APGAR score of less than 7 at 5 minutes, and the need for Neonatal Intensive Care Unit (NICU) admission.

Results: The mean age of the patients in Group A was 26.2+ and 24.4+4.8 in Group B. The most common indication for the induction of labor was prolonged pregnancy. Group A had more cesarean sections than Group B. This difference was found to be statistically significant. There were no cases of uterine rupture in either group. The difference in the frequency of PPH between the two groups was not statistically significant. Group A had more newborns with an APGAR score of less than 7 at 5 minutes and more NICU admissions than in Group B. This difference was found to be statistically significant.

Conclusion: The induction of labor is associated with an increased rate of cesarean section, low APGAR score (<7) at 5 minutes, and NICU admission, but it has no association with uterine rupture and Primary Post-partum hemorrhage.

Keywords: Induction of labor, Cesarean section, APGAR score, PPH.

This article may be cited as: Akhtar Z, Khan J, Qadir M, Bangash AG. Feto-Maternal Outcomes in Induced Versus Spontaneous Onset of Labor. J Med Sci 2025 July-September;33(3):121-125

INTRODUCTION

Labor with spontaneous natural onset is less painful and carries fewer complications as compared to induced labor. Induction of labor means to initiate uterine contractions by artificial means, causing progressive cervical dilatation and effacement. [1] It is not a favorable option because of its association with maternal and fetal complications.

However, there are many conditions where an obstetrician is left with no choice but to induce labor. The primary indication for induction of labor is when the outcome for mother and baby will be improved by interrupting pregnancy rather than awaiting the spontaneous onset of labor. The decision to induce labor should not solely be made by the obstetrician. He/she should include the couple in this decision and should seek their wishes regarding the decision. The risks versus benefits of continuing versus induction of labor should be explained in detail to the couple. [2]

Correspondence
Dr Arzoo Gul Bangash
Assistant professor
Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar.
Cell: +92 333 - 9165875
Email address: arzoobangash@gmail.com
Date Received: 13/08/2024
Date Revised: 19/08/2025
Date Accepted: 21/08/2025

There are many recognized indications for the induction of labour, each carrying a potential risk of perinatal morbidity and mortality. They include prolonged pregnancy, pre-labor rupture of membranes, preterm pre-labor rupture of membranes, pregnancies complicated by uncontrolled diabetes, hypertension, and intra-uterine fetal growth restriction. Inductions for maternal requests and social reasons are on increasing trends nowadays, in addition to medically indicated reasons. [3]

Induction of labor is a common obstetric intervention. Local data is very scarce, but internationally, the incidence of induction of labour is approximately 20%. A rise in the rate of induction of labor has been observed in the last 30 years in most developed countries. The RCOG Patterns of Maternity Care report found the mean induction rate for primiparous women was 27.5% and 21.5% for multiparous women in the UK. The reports highlight that the wide variation in induction rates is not explained by demographic or clinical risk factors. [4]

Induced labor is more painful, and there is an

increased need for maternal and fetal surveillance and epidural analgesia. Moreover, it may fail to initiate uterine contraction. Failed induction is defined as failure to establish labor after one cycle of treatment, consisting of 2 vaginal tablets of PGE2 (3 mg) or gel (1- 2 mg) at 6-hourly intervals, or one PGE2 controlled-release pessary (10 mg) over 24 hours, and is estimated to occur in 15 percent of cases. [5] Other complications associated with the induction of labor are uterine hyperstimulation, increased risk of operative delivery, uterine rupture, and postpartum hemorrhage. Cord prolapse and fetal distress may also occur. The cause of fetal distress is an interruption in oxygen supply due to intense uterine contraction during induced labor. Therefore, the WHO recommends that each case of induction of labor should be thoroughly assessed by a senior obstetrician according to the protocol of the department. Adherence to the protocol should be implemented in the true spirit to minimize the complications of the induction of labor. [6, 7]

Our hospital is located in the center of the provincial capital and serves a large population of the region. Our unit handles numerous high-risk pregnancies that require early delivery through induction of labor. The aim of our study is to examine the relationship between induction of labor and maternal and fetal outcomes, including mode of delivery, uterine rupture, postpartum hemorrhage, APGAR score <7 at 5 minutes, and NICU admission. The purpose of our study is to contribute evidence to existing data and assist policymakers in developing or re-evaluating strategies to reduce complications associated with this common yet significant obstetric intervention.

Patients and Methods. This retrospective cohort study was conducted in the Obstetrics and Gynecology unit of Khyber Teaching Hospital, Peshawar. The duration of the study was from 1st October 2023 to 31st March 2024. All of the patients with singleton pregnancies requiring the induction of labor were included in the study. Patients with previous 2 cesarean sections and patients with multiple pregnancies were excluded. The institutional research and ethics board approval was granted vide letter no 246/DME/KMC dated 28th March 2024 for starting the study.

The sample size was calculated using the WHO sample size calculator. Keeping the prevalence of induction of labor of 20%, margin of error 5.55, and confidence interval of 95%, the sample size came out to be 200. A convenient non-probability sampling technique was used for the study.

Data collection. The medical records and registers, which were maintained in the department and hospital record room, were approached to identify the patients who had undergone the process of induction of labor from 1st October 2023 to 31st March 2024. The total sample size was 200. One hundred Patients who had undergone the process of induction of labor with prostaglandin/misoprostol or oxytocin were included in Group A. The other 100 patients with spontaneous onset of labor were included in Group B. The process of labor was monitored by using the WHO labor care guide. Both of the groups were followed throughout their labor till delivery according to standard obstetrics protocol. A Structured proforma was used to collect the demographic details of the patients, mode of delivery, post-partum hemorrhage, uterine rupture, APGAR score < 7 at 5 minutes, and NICU admission.

SPSS version 22 was used for the data analysis. The Mean and standard deviation were calculated for numerical data. The frequency and percentages were calculated for categorical data. Chi-square test was applied to see the association of categorical data. P-value < 0.05 was considered significant.

RESULTS

Out of 200 patients, 186 were un-booked (93%). The mean age of patients in Group A was 26.2 $\pm$5, while the mean age of the patients in Group B was 24.4 $\pm$ 4.8 (Table 1). In Group A, the majority of patients were primigravidas, whereas in Group B, multigravidas were more in number (Table 2).

Grand multigravidas were fewer in number in both groups. The indications for induction of labor were prolonged pregnancy, PROM, and hypertensive disorders of pregnancy in descending order of frequency (Table 3). In Group A, 69 patients were delivered normally, and 31 patients had undergone caesarean section. In Group B, 95 patients were delivered normally, while 5 patients needed a caesarean section (Table 4).

Fortunately, uterine rupture was not seen in either group. Primary post-partum hemorrhage was observed in 6 patients in Group A and 2 patients in Group B. The APGAR score < 7 at 5 minutes was documented in 14 patients in Group A, while only 1 newborn in Group B had an APGAR score< 7 at 5 minutes. NICU admission was required for 13 newborns in Group A, whereas all of the newborns in Group B were healthy and did not require NICU admission (Table 4).

Table No 1: Age of the patients

Group	Mean age + SD
Group A	26.2+5
Group B	24.4+4.8

Table No 2: Parity of the patients in both groups

	Group A. Induced n=100	Group B. Spontaneous n=100
Primigravidas.	63	33
Multigravidas.	34	56
Grand multigravidas.	3	11

Table No 3: Indications for induction of labor

Indications for induction of labor	Frequency (%)
Prolonged pregnancy.	42 (42%)
Pre-labor rupture of membranes.	22 (22%)
Hypertensive disorders of pregnancy.	14 (14%)
Nil liquor.	10 (10%)
Decreased fetal movements.	7 (7%)
Obstetric cholestasis.	5 (5%)

Table No 4: Feto-maternal outcome in induced versus spontaneous onset of labor

Outcomes	Subgroups	Group A. induced group. N=100	Group B. Spontaneous group. N=100	X2 (df =1)	P-value
Mode of delivery	NVD	69	95	22.9	0.000
	Caesarean section.	31	5		
Uterine rupture	Yes.	0	0	-	-
	No.	100	100		
PPH.	Yes.	6	2	2.08	0.149
	No.	94	98		
APGARscore< 7 at 5 minutes.	Yes.	14	1	12.2	0.000
	No.	86	99		
NICU admission.	Yes.	13	0	13.9	0.000
	No.	87	100		

DISCUSSION

The induction of labor is needed when the continuation of pregnancy may cause harm to the mother and baby. The incidence of induction of labor is variable all over the world. In developed countries, it is as high as 25%. [8-10] The lowest incidence of 1.4% is reported from Niger. [11.]

In our study, the mean age ± SD in Group A was 26.2± 5 and in Group B it was 24.4 ± 4.8. Similar age ranges are reported by Vivienne Souter in her study. [12] In Group A, 63% of patients were primigravidae, 34% multigravidae, and 3% grand multigravidas. Whereas in Group B, 33% were primigravidas, 56% were multigravidas, and 11 % were grand multigravidas. It is in contrast to the findings reported by Osaheni Lucky Lawani in her study in Nigeria, which showed primigravidas to be 28.5%, multigravidas 63.8%, and grand multigravidas 7.7%. [13] The increase in the number of multigravidas and grand multigravidas in Nigeria can be explained by the lack of contraceptive practices in Nigerian women.

An important aspect of the induction of labor is that there should be a valid indication for the induction of labor. Results of our study showed that the most common indications for induction of labor were prolonged pregnancy (42%), followed by PROM (22%) and hypertensive disorders of pregnancy (14%). Bako also finds prolonged pregnancy and hypertensive disorders to be the most common indications for the induction of labor. [14] Contrary to this, Shafqat T reported PROM (32.9%) to be the commonest reason for induction of labor, followed by prolonged pregnancy (30.6%) and eclampsia/pre-eclampsia (27.6%). [15] This emphasizes that the most common indications for induction of labor are almost the same across various studies with different orders of chronicity.

In Group A, 31% of patients had to undergo cesarean section as compared to 5% in Group B. This difference is significant (p-value 0.000). Lamichhane S also reported a high cesarean section rate of 32.3% in the induced group. [16] However, a Cochrane review concluded that caesarean section is not increased by the induction of labor. [17, 18] No uterine rupture was noted in any group. Similar findings are reported by Shafqat T. [15] This may be due to vigilant monitoring of labor and early intervention to avoid uterine rupture. Whereas Hokkila E found uterine hyperstimulation and risk of rupturing the uterus in the induced group. [19]

The difference in Primary PPH between the two groups was not statistically significant. Similar results are shown by a study done by Vivienne Souter. [12] Active management of the third stage of labor has resulted in a decrease in the incidence of Primary PPH. The difference in APGAR score <7 at 5 minutes in both groups was significant (14 versus 1. P-value 0.000). F Thagarajah found no difference in APGAR score in the induced versus spon-

taneous group. [20.]

In our study, 13 newborn babies in Group A were admitted to the NICU, whereas none in Group B needed NICU admission. This finding was statistically significant (0.000). Senanayake Hemantha also reported a statistically significant difference in NICU admission (15.8% versus 8.6% (p-value <0.001). [21] Vivienne Souter found no association of induction of labor with adverse neonatal outcome and NICU admission. [12]

CONCLUSIONS

Induction of labor is associated with an increased rate of cesarean section, APGAR score <7 at 5 minutes, and need for NICU admission. It is not associated with an increased incidence of PPH and uterine rupture. The process of induction of labor cannot be stopped because of its association with complications, and there are situations where obstetricians are left with no choice but to induce labor. However, these complications can be significantly reduced with the proper selection of patients and thorough monitoring throughout labor.

REFERENCES

1. Leduc D, Biringer A, Lee L, Dy J; Clinical Practice Obstetrics Committee; Azzam H, Barrett J, Biringer A, Campbell K, Duperron L, Dy J, Giesbrecht E, Graves L, Helewa M, Lange I, Lee L, Muise S, Parish B. Induction of labor: review. J Obstet Gynaecol Can. 2015 Apr;37(4):380-3. English, French. doi: 10.1016/s1701-2163(15)30290-5. PMID: 26001692.
2. Tenore JL. Methods for cervical ripening and induction of labor. Am Fam Physician. 2003 May 15;67(10):2123-8. PMID: 12776961.
3. WHO recommendations: induction of labor at or beyond term. Geneva: World Health Organization; 2018. ISBN. 978-92-4-155041-3
4. WHO recommendations for inductions of labor. Geneva: World Health Organization;2011
5. Delaney M, Roggensack A. No. 214-Guidelines for the management of pregnancy at 41+0 to 42 +0 Weeks. J Obstet Gynecol Can.2017;39 (8):e 164—74
6. RCOG. Patterns of Maternity Care in English NHS Hospital 2011/12. NHS Information Centre. NHS Maternity Statistics 2011-12. Summary report, www.hsic.gov.uk/ catalogue/ PUB09202.
7. RCOG. The Investigation and Management of the small for gestational age Fetus. Green top Guideline No.31. London: RCOG. February 2013. Minor revision January 2014.
8. Caughey AB, Sundaram V, Kaimal AJ, Cheng YW, Gienger A, Little SE, Lee JF, Wong L, Shaffer BL, Tran SH, Padula A, McDonald KM, Long EF, Owens DK, Bravata DM. Maternal and neonatal outcomes of elective induction of labor. Evid Rep Technol Assess (Full Rep). 2009 Mar ;(176):1-257. PMID: 19408970; PMCID: PMC4781541.
9. Declercq ER, Sakala C, Corry MP, Applebaum S. Listening to Mothers II: Report of the Second National U.S. Survey of Women's Childbearing Experiences: Conducted January-February 2006 for Childbirth Connection by Harris Interactive(R) in partnership with Lamaze International. J Perinat Educ. 2007 Fall;16(4):9-14. doi: 10.1624/105812407X244769. PMID: 18769512; PMCID: PMC2174380.
10. Martin JA et al. Births: final data for 2005, National Vital Statistics Report, 2007, 56:1-104.
11. WHO Global Survey on Maternal and Perinatal Health. Induction of labor data. Geneva, World Health Organization, 2010(available at: http://www.who.int/reproductive-health/topics/best_practices/global_survey).
12. Souter V, Painter I, Sitcov K, Caughey AB. Maternal and newborn outcomes with elective induction of labor at term. Am J Obstet Gynecol. 2019 Mar;220(3):273.e1-273.e11. doi: 10.1016/j.ajog.2019.01.223. Epub 2019 Feb 17. PMID: 30716284.
13. Lawani OL, Onyebuchi AK, Iyoke CA, Okafo CN, Ajah LO. Obstetric outcome and significance of labor induction in a health resource-poor setting. Obstet Gynecol Int. 2014; 2014:419621. doi: 10.1155/2014/419621. Epub 2014 Jan 20. PMID: 24578709; PMCID: PMC3918372.
14. Bako BG, Obed JY, Sanusi IM. Methods of induction of labour at the University of Maiduguri Teaching Hospital, Maiduguri: a 4-year review. Nigerian Journal of Medicine. 2008 Jul 24;17(2):139-42.
15. Shafqat T, Zeb L, Fatima SS, Brittany R. Maternal and fetal outcomes in women undergoing induction of labor with low-dose vaginal misoprostol. Pak J Med Sci [Internet]. 2023Aug.2 [cited 2025Jan.9];39(5). Available from: https://www.pjms.org.pk/index.php/pjms/article/view/7072
16. Lamichhane S, Subedi S, Banerjee B, Bhattarai R. Outcome of Induction of Labor: A Prospective Study. Ann. Int. Med. Den. Res. 2016; 2(6):OG01-OG05.
17. Neilson JP. Induction of labor for improving birth outcomes for women at or beyond term. Obstet Gynecol. 2007 Mar; 109(3):753-4. Doi: 10.1097/01.AOG.0000257122.58009.1d. PMID: 17329530.
18. Dare MR, Middleton P, Crowther CA, Flenady VJ, Varatharaju B. Planned early birth versus expectant management (waiting) for pre-labor rupture of membranes at term (37 weeks or more). Cochrane Database Syst Rev. 2006 Jan 25 ;(1): CD005302. Doi: 10.1002/14651858.CD005302.pub2. Update in: Cochrane Database Syst Rev. 2017 Jan 04;1: CD005302. Doi: 10.1002/14651858.CD005302.pub3. PMID: 16437525.
19. Hokkila E, Kruit H, Rahkonen L, Timonen S, Mattila M, Laatio L, Ordén MR, Uotila J, Luukkaala T, Tihtonen K. The efficacy of misoprostol vaginal insert compared with oral misoprostol in the induction of labor of nulliparous women: A randomized national multicenter trial. Acta Obstet Gynecol Scand. 2019 Aug; 98(8):1032-1039. doi: 10.1111/aogs 13580. Epub 2019 Mar 12. PMID: 30771243.

20. Thangarajah F, Scheufen P, Kirn V, Mallmann P. Induction of Labour in Late and Post-term Pregnancies and its Impact on Maternal and Neonatal Outcome. Geburtshilfe Frauenheilkd. 2016 Jul; 76 (7):793-798. Doi: 10.1055/s-0042-107672. PMID: 27582577; PMCID: PMC5001572.

21. Senanayake, H., Mariani, I., Valente, E.P., Piccoli, M., Armocida, B., Businelli, C., et al. (2022) Outcomes of Induction versus Spontaneous Onset of Labour at 40 and 41 GW: Findings from a Prospective Database, Sri Lanka. BMC Pregnancy and Childbirth, 22, Article No. 518. https://doi.org/10.1186/s12884-022-04800-1

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Akhtar Z	✓	✓	×	×	✓	×
Khan J	✓	✓	×	✓	✓	×
Qadir M	✓	✓	×	×	✓	×
Bangash AG	✓	✓	×	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Teaching Hospital, Peshawar. Vide No. 246/DME/KMC. Dated: 28 03 2024