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ORIGINAL ARTICLE

Maternal and Fetal Outcomes of Labour Induction at 39 vs 41 Weeks of Gestation

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ABSTRACT

Objective: To evaluate the maternal and fetal outcomes in elective induction of labour (IOL) at 39 weeks versus 41 weeks to suggest future guidelines for obstetric patients. The study compared the effects on mode of delivery (MOD), APGAR score, NICU admission and still birth rate.

Methodology: A Randomized controlled trial (RCT) and a single-center prospective study was conducted from October 2019 to July 2021 at Al-Nafees Medical College and Hospital, Islamabad. Low-risk primigravida (PG) and multigravida (MG) who delivered non-anomalous singletons fetus between 39 and 41 weeks after induction of labour (IOL) were included. To measure the maternal out come in view of MOD (vaginal or caesarean section) and fetal out comes (APGAR score at 5 minutes, NICU admission and still birth (SB) rate) were assessed.

Results: Two groups of 120 patients participated in the trial: group A (39 weeks) and group B (41 weeks), each group comprising of 60 patients. In group A, 85% of patients had a vaginal delivery, compared to 73% in Group B. Group A had a 15% CS rate while Group B had 27%. Group A had NICU admission rate of 3.3% while Group B had 12%. The two groups APGAR scores did not differ significantly, with APGAR > 7 being 95% in Group A and 97% in Group B

Conclusion: Elective IOL at 39 weeks does not increase caesarian rate, with no significance difference in APGAR score however NICU admission rate was higher in women delivered at 41 weeks of gestation.

Keywords: Induction of Labour, Fetal outcomes, Maternal outcome, postdate pregnancy.

Authors' Contribution:
[1,2]Conception; Literature research; manuscript design and drafting; [3,4]Critical analysis and manuscript review; [5,6]Data analysis; Manuscript Editing.

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Introduction

Human pregnancies last an average of 280 days, although there are many variations. According to definitions, a "term" is any duration between 37 and 42 weeks.[1] The pathophysiology of labor induction involves softening and opening the cervix to start labor artificially and cervical ripening is the cervix becomes softens and its connective tissue is remodeled before labor begins. This process can be induced mechanically or pharmacologically.

Mechanical methods include using a Foley catheter or double-balloon device to place a device through the endocervical canal. Pharmacological methods include using synthetic prostaglandins, such as, dinoprostone (PGE2), or misoprostol (PGE1). Stripping the membranes, this involves sweeping a gloved finger between the amniotic sac and the uterine wall to separate the membranes from the cervix. This can cause the body to release prostaglandins, which can soften the cervix and cause contractions. Artificially breaking the water

(amniotomy) is one of the final steps in labor induction.[2] If needed, a hormone drip, such as oxytocin, can be used to start contractions. Oxytocin is administered intravenously.

Induction of labor (IOL) can be uncomfortable and painful, and it can take more than 24 hours for the baby to be born. The experience of birth for women who undergo labor induction can be less favorable than for those who go into labor naturally.

IOL is a common clinical practice used in obstetrics medicine, involving the induction of regular uterine contractions prior to the advent of labor on its own.[2] This can be achieved using pharmacological or mechanical methods to facilitate progressive cervical dilatation and delivery.[2] The decision to induce labor is based on the assessment of the potential benefits of delivery for both the mother and fetus compared to the risks of carrying on with the pregnancy. The timing of birth and the clinical management involved in this process are still under discussion.[3] There is some uncertainty about finding the right balance between waiting for natural labor to start during pregnancy and deciding when to induce labor through medical means. Elective IOL provides the convenience of a scheduled timing, reducing the likelihood of adverse events such as pre-eclampsia or stillbirth when labor is initiated earlier. Additionally, postdate pregnancy is one of the most common reasons for the induction of labor. IOL is generally acknowledged to be advised when it is thought that the woman, the fetus or both will fare better than with expectant management, which involves waiting for spontaneous onset of labor.[4-7] Additionally, as a medical procedure, IOL should be performed as long as informed consent is given [4,6,8] and when the reasons for the induction, along with the particular risks and advantages, as well as the technique of decision, are outlined in detail. A number of factors, such as the rationale for induction, the woman's features, the induction technique and other predictors of successful induction, might affect the outcome of induced labor.[9] Research indicates that neonatal risk fluctuates across different gestational ages, leading to a heightened emphasis on identifying the ideal time for birth to reduce the chances of adverse perinatal outcomes at term.[10] Presently, studies recommend that the best period for childbirth, in terms of the health of both the infant and the mother, is between 39 weeks and 40 weeks plus 6 days of pregnancy, barring any medical need for an earlier delivery. Approximately 58% of births happen within this time-frame.[11] There is a scarcity of local data on the optimal timing for inducing labor to prevent complications related to prolonged pregnancies. Existing literature primarily compares various methods of IOL in extended pregnancies instead of determining the best time for induction.[11,12] Consequently, the clinical question of when induction yields the best outcomes remains unanswered.[13-16] Between 2007 and 2017, the percentage of people experiencing IOL increased by nearly 10%, with more than one in four (25.5%) having an IOL in 2017.[17] More frequent use of induction techniques is driven by increasing numbers of pregnant people with medical complications during pregnancy and use of elective IOL prior to 42 completed weeks. In addition, there is renewed interest in elective IOL following the publication of the ARRIVE trial (A Randomized Trial of Induction Versus Expectant Management), which demonstrated benefits of IOL at 39 weeks' gestation on rates of cesarean birth and hypertensive disorders of pregnancy among low-risk, nulliparous women in some settings.[17]

Multi-center trials indicate that inducing labor at 39 weeks in low-risk first time mothers significantly reduces the rate of cesarean deliveries without raising the incidence of unfavorable perinatal outcomes in contrast to expectant management.[18-21] Due to ongoing debates about the optimal timing for labor induction in impending post-term pregnancies in our population, we conducted a study to compare the mode of delivery (SVD and LCSC) and fetal outcomes (stillbirth, 1-minute APGAR score, NICU admission) between elective inductions at 39 weeks

and those at 41 weeks. This study aims to evaluate the maternal and fetal outcomes in elective induction of labour (IOL) at 39 weeks versus 41 weeks to suggest future guidelines for obstetric patients. The study compared the effects on mode of delivery (MOD), APGAR score, NICU admission and still birth rate.

Methodology

This single-center prospective RCT was conducted from October 2019 to July 2021 at Al-Nafees Medical College and Hospital, Islamabad Pakistan**.** Informed consent was obtained from all participants before inclusion in the study.

IOL was offered to all low-risk pregnant women, who fulfilled the inclusion criteria between 36-38 weeks of gestation with written informed consent. Exclusion criteria included all high-risk pregnancies such as Diabetes, hypertension, preterm pre-labour rupture of membranes, antepartum hemorrhage, fetal growth restriction, pregnancies before 39 and beyond 42 weeks, fetus with abnormal lie, malposition or with anomalies, previous uterine scar/ C section.

The sample size was estimated using the WHO calculator. A hypothesis test for two populations (an unpaired t-test was used). Keeping the level of significance, a p-value of <0.05, a confidence level 95% with margin of error 5%, the power of the study 80%, the anticipated population proportion Group A (39 weeks) was 35%, and the anticipated population proportion (postdates) Group B was 10% (obtained from previous data of Al-Nafees Medical College and Hospital, Islamabad). The calculated total sample size was 120 and 60 for each group.

Last menstrual Period (LMP) and dating scan confirmed gestational age. A Pre-designed Performa (annexure) was filled by the duty doctor with lottery method. In group A, patients were admitted at 38 completed weeks and 6 days. Group B patients were followed up until 40 completed weeks and 6 days and then they were admitted for IOL. All patients were admitted one day before the planned IOL and history, examination, BPP, and CTG were performed at the time of admission. Induction of labour was started (according to hospital policy) at 6:00 am in the early morning with PGE2 3mg (generic name of PGE2 is dinoproston). CTG was performed before and after IOL and re-evaluation of Bishop Score was performed six hours following the 1st dose of PGE2 if the patient did not go into established labour and the 2nd dose of PGE2 was repeated. The third dose of PGE2 was placed after evaluating the bishop score if the patient did not go into established labour for 24 hours after the first dose of PGE2. Bishop's score was evaluated again six hours after the third dose. If a patient went into established labour, feto-maternal surveillance was carried out with a modified WHO partograph. However, failed induction was labeled after 48 hours of the third dose of PGE2 if bishop score was <7. The maternal outcome regarding mode of delivery whether vaginal or abdominal were recorded. The neonatal outcome was recorded by on-duty pediatrician by calculating the APGAR score at 5 minutes, NICU admission or still birth.

SPSS version 22 statistical software was used to analyze the data. Descriptive statistics was used to summarize age and other demographic variables. Inferential statistics, specificlt the unpaired t-test, were used to contrast the group A and group B mean differences. The co relation between the categorical data of maternal and fetal outcomes in both groups was determined using the Chi-square test.

The study protocol was approved by the **institutional review board** of Isra University, Al Nafees Medical College, Islamabad. (Ref #: F/ 2/ IUIC-ANMC/EC-218/2019). **RCT NUMBER :**1466[cnl-pioms-1466]

Results

Total of 150 patients were recruited. Group A was induced at 39 weeks while group B was induced at 41 weeks of pregnancy. Nine patients from Group A

dropped out as they went into spontaneous labour, and thirteen patients from Group B went into spontaneous labour, and hence they were excluded from the study. After induction of labour, 5 patients from Group A declined further participation after the first dose of PGE2 while 3 participants from Group B declined after two doses of PGE2. The total study population included 120 patients with 60 participants in each group. In the mode of delivery, it did not show a significant difference (p-value ±0.116). In group A, 85% (n=51) of patients had a spontaneous vaginal delivery, compared to 73% (n=44) in Group B. Group A had a 15% (n=9) Caesarean section rate, while Group B had a 27% (n=16) rate (p-value± 0.116). Group A had a neonatal intensive care unit (NICU) admission rate of 3.3%, while Group B had a 12% rate, with a significant p-value of ±0.032. The two groups' APGAR scores did not differ significantly from one another, with APGAR > 7 being 95% in Group A and 97% in Group B (p-value ±0.117).

Table I: Comparison of Delivery Outcomes for Participants with BMI <30

BMI <30	SVDs	LSCS	P value
A	31	09	±0.596
B	26	10	

Table II: Comparison of Status and Delivery Outcomes between Group A and Group B.

Status	Group A (n=60)	Group B (n=60)	Total (N=120)
Booked	51	43	94
Non-Booked	9	17	26
Total	60	60	120
Variables			
Normal Delivery	51 (85%)	44 (73%)	
Cesarean section	9 (15%)	16 (27%)	

Table III. Relationship between Cervical Favorability (Bishop Score) and Subsequent Mode of Delivery.

Bishop Score	Group A (48)		Group B (44)	
	SVD	LSCS	SVD	LSCS
<5 (92)	39	09	28	16
≥5(28)	12	NIL	16	NIL
Total	51	09	44	16

Table No IV: Level of prostaglandin E2 Doses

Prostaglandin E2 Doses	39 weeks (Group A)		41 weeks (Group B)	
	SVD n (%)	LSCS n (%)	SVD n (%)	LSCS n (%)
Single Dose	27 (100)	NIL	22 (88)	3 (12)
More than a single dose	24(73)	9 (27)	22 (63)	13 (37)
Total	51 (85)	9 (15)	44 (73)	16 (27)

Table V: Comparison of Maternal Delivery Outcomes and Neonatal Characteristics between Group A and Group B.

Mode of delivery	Group A (n=60)		Group B (n=60)	
	Primigravida n (%)	Multigravida n (%)	Primigravida n (%)	Multigravida n (%)
Normal Delivery	21 (70)	30 (100)	18 (60)	26 (87)
C-Section	09 (30)	NIL	12 (40)	04 (13)
Total	30	30	30	30

Fetal weight at birth	A (39 weeks)	B (41 weeks)
< 2Kg	1	NIL
2.1 – 2.4 Kg	5	1
2.5 -3.5 Kg	43	42
3.6 - 4 Kg	8	13
>4Kg	2	5

Apgar Score	Group A (n=60)	Group B(n=60)	P Value
<7	3	2	0.117
>7	57	58	

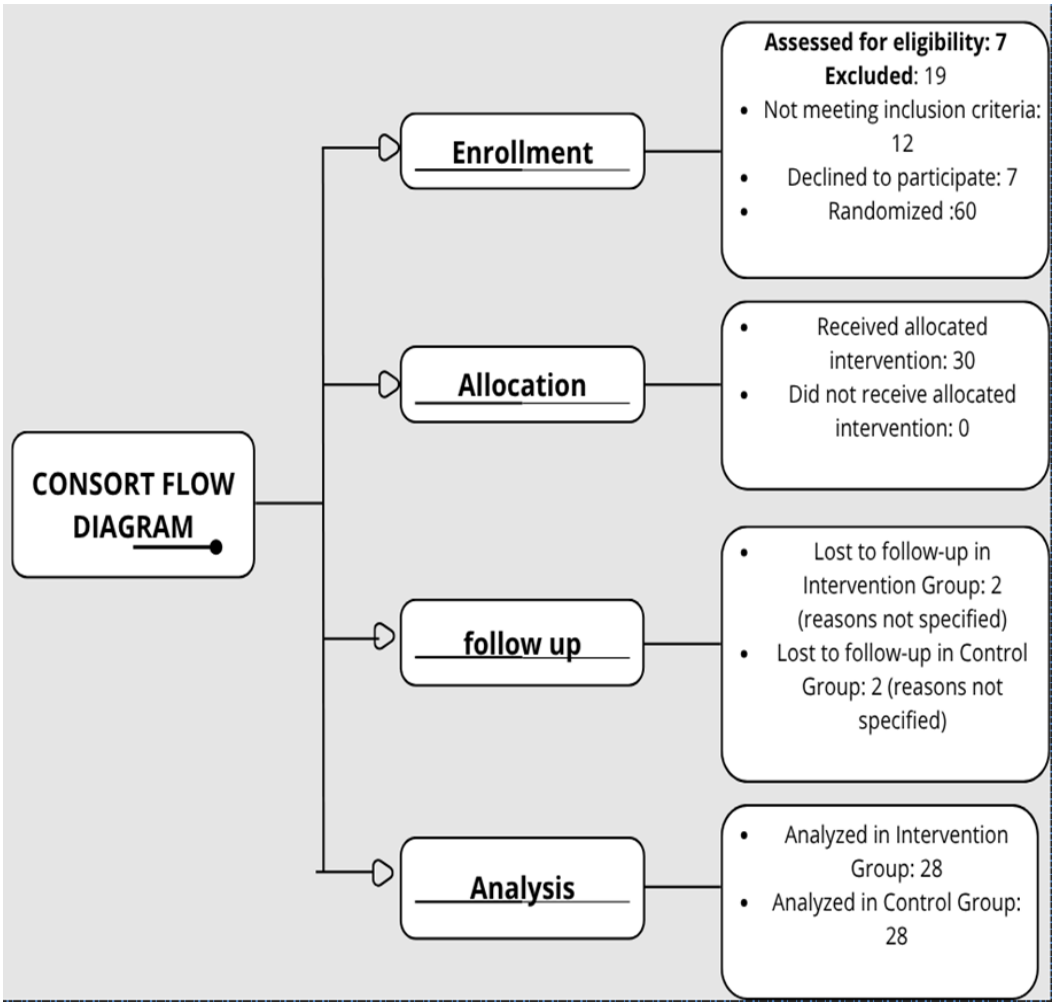

Figure 1. Flow of Participants Through the Randomized Trial, from Assessment of Eligibility to Final Analysis

Discussion

Inducing uterine contractions before the spontaneous onset of labor through intervention, for progressive dilation of the cervix, effacement, and the birth of the baby is known as labor induction.[22] Elective induction, which is when labor is induced without any medical or obstetrical reasons, is a common practice and adds to the rising rate of inductions overall.[7] Research indicates that opting for induced labor may lower the likelihood of cesarean delivery by averting potential complications linked to extended gestation.[22]

In a study by Sinkey RG and Lacevic J, P IOL at 39 weeks led to a decreased rate of cesarean sections (p value <0.01), as well as reduced incidence of maternal morbidity, in comparison to waiting for labor and inducing it at 41 weeks.[7]

Another recent study which is comparable to our study has found that low-risk women induced at 39 weeks have a lower cesarean delivery rate compared to those who were managed expectantly.[23] Induction of labor does not necessarily increase the likelihood of cesarean delivery. However, certain factors such as fetal distress, failure to progress in labor, or maternal complications may increase the likelihood of cesarean section regardless of the gestational age at induction.[22] In a randomized controlled study in primigravida at 39 weeks, the C. sec rate was

reduced as compared to a group of 41 weeks women (18.6% vs. 22.2%).[23] The decision to proceed with cesarean section after failed induction should be based on a careful assessment of fetal and maternal well-being, progress of labor and potential risks and benefits. Decisions regarding the timing of labor induction should be individualized and based on a thorough assessment of the mother's overall health, medical history, fetal well-being and preferences.

In the study of the ARRIVE trial, the combination of severe neonatal problems or perinatal death was the main outcome for the babies and it was 20% lower in the induced group. More precisely, the affected newborn populations were 4.3% in the induced group and 5.4% in the expectant management group.[23] William A. Grobman found that the study concluded that choosing to induce labor at 39 weeks of pregnancy did not lead to more perinatal complications compared to waiting for labor to begin naturally.[23] In each of the studies, elective induction of labor led to improved outcomes for both mothers and babies, with better overall results measured by quality adjusted life years (QALYs) and a decrease in specific perinatal complications such as shoulder dystocia, meconium aspiration syndrome, pre-eclampsia and the need for neonatal respiratory support. Extended pregnancy is linked to a higher chance of macrosomia, which can lead to birth complications such as shoulder dystocia and neonatal hypoglycemia. Evaluating birth weight distributions between the two groups can elucidate whether early induction reduces the incidence of macrosomia.[2]

The obstetricians should not start inducing every low-risk woman. However, if a woman at low risk requests an induction, health care providers will no longer cite evidence that it raises the likelihood of having a C-section. To deliver high-quality care, health care professionals working in maternal health care services at all levels, especially in low and middle-income countries, should have access to the right medications and be trained in relevant procedures. Additionally, other stakeholders require current, evidence-based guidelines to shape clinical policies and practices, enhance the quality of care and ultimately improve health care outcomes.

Conclusion

Elective induction of labour at 39 weeks is not associated with increased incidence of caesarean section. The APGAR score at 5 minutes of birth in both groups did not show any significant difference. More than 95% babies delivered with an APGAR of > 7. NICU admission rate was higher in expectant management group mostly due to meconium-stained liquor and macroscopic babies. No stillbirth was recorded in both the groups. Obese patients with BMI >30 revealed a significant difference in terms of mode of delivery with increased caesarean section rate in the expectant group.

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