

A Comparative Study On Labour Progression After Elective Induction Of Labour Vs. Spontaneous Progression Of Labour In Primigravidae At Term At A Tertiary Care Hospital

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ABSTRACT

Background: In modern obstetrics, inducing labor is a routine practice. The National Centre for Health Statistics' data show that over the past ten years. The reasons behind this increase in the induction rate are intricate and multifaceted. The majority of the signs for induction of labor have not changed.

Methods: Cross-sectional comparative research in a hospital. There were two groups in the research population. In spontaneous labor, 100 primigravidae women at term were admitted to MGMH. 100 ladies were admitted for labor induction. The research was carried out in the Modern Government Maternity Hospital in Petlaburj, India. This research was carried out between October 2020 and October 2022.

Results: To the best of our knowledge, this is one of the first studies to compare the outcomes for mothers and newborns in primigravida who underwent both induced and natural labor. The study's key strength is the inclusion of a sufficient number of pregnant women in a representative sample, which boosted the study's power and made it more generalizable to settings with similar conditions. The chance of errors was decreased by using specialized software for data collecting and processing.

Conclusion: This can be accomplished by carefully assessing the maternal and fetal conditions and validating the pertinent indicators. Additionally, proactive planning and diligent monitoring should be used to lower the number of induced labor women who need to be admitted to the NICU.

Keywords: Labour progression, spontaneous progression, primigravidae, tertiary care hospital

INTRODUCTION

Induction of labor is a standard practice in modern obstetrics. According to data from the National Centre for Health Statistics, the rate of labor induction has gradually climbed over the last decade, from 9% to 20%. The explanations for this increase in the induction rate are

complicated and multifactorial. Indications for induction of labor have remained mostly unchanged. Another broad notion is the knowledge that induction is related with greater complications, such as increased caesarean delivery, when compared to spontaneous labor [1, 2]. The advantages of labor induction must be balanced against the potential maternal and fetal dangers of the operation. Induction of labor is thought to be associated with an increase in the risk of instrumental delivery, which has been demonstrated for both inductions. In nulliparous women, nearly half of inductions result in an instrumental delivery, resulting in an overall Caesarean section rate of up to 22% [3]. Instrumental delivery is linked to maternal and fetal morbidity, as well as mortality. There appears to be a link between vaginal instrumental delivery and long-term neurological and structural damage to the pelvic floor. Furthermore, vaginal instrumental delivery is linked to higher mother and fetal mortality and morbidity. In women who require Caesarean section, the operation not only entails the operating risks of the index pregnancy, but it also raises the risks of future pregnancies [4]. Because induction has both advantages and downsides, it is necessary to investigate the progression of labor, mother and fetal outcomes of both spontaneous and induction labor. Medical advantages of planned induction of labor at full term include a reduction in stillbirths and sustained fetal growth, which prevents macrosomia and accompanying consequences. A patient's life or a provider's schedule being unexpectedly disrupted can be less likely with an elective labor induction. Those investigations showed that perinatal and maternal issues were associated with an increased risk as early as 40 weeks of gestation. But if the gestational age is under 39 weeks, elective induction may have drawbacks such extended labor, the potential for patient/provider annoyance, Caesarean delivery, a lengthened latent period, greater expenditures, and new-born morbidity. According to the Bishop score, the cervical status may be one of the most important indicators of a successful vaginal delivery when labor is induced because the Caesarean delivery rate, which is thought to be the most significant and harmful result of labor induction, is inversely correlated with cervical favorability at induction [5-11].

An important topic of research in the realm of obstetrics is the study of primigravidae. This group of women has developed a greater interest in labor management in recent years. It is crucial to compare the results of women who underwent elective induction and those who did not in order to assess the efficacy and safety of this procedure in primigravidae. In order to ascertain whether labor may be induced without problems or if spontaneous advancement would be preferable, this study was conducted on primigravidae [12].

Since tertiary care hospitals are managing complicated pregnancies, it is essential to have an investigation from tertiary care hospitals regarding the labour progression after elective induction of labour vs. spontaneous progression of labour in primigravidae at term. Hence, we aimed to study the labour progression after elective induction of labour vs. spontaneous progression of labour in primigravidae at term at a tertiary care hospital [13, 14].

The aim and the objectives of the study, to compare the progression of labor in primigravidae who had intentional induction of labor at term to that of spontaneous labor in a tertiary care hospital. To compare the length and progression of labor in both induced and spontaneous labor. To contrast the outcomes for the mother and the baby in naturally occurring versus artificially induced labor. To develop enhancing methods that won't harm fetal and maternal outcomes.

Methods

A cross-sectional comparative study conducted in hospitals. The study's participants fell into two categories. 100 primigravida women who were at term and in spontaneous labor were admitted to MGMH. 100 ladies were admitted for labor induction. In Petlaburj, India's Modern Government Maternity Hospital, this study was carried out. The months of October 2020 and October 2022 were used for this investigation.

Inclusion criteria

1. Primigravida
2. Singleton Pregnancy
3. Cephalic Presentation
4. Completed 37 weeks of gestational age
5. Spontaneous labor pain
6. Induced labour
7. Amniotic fluid index >5 cm
8. Placenta in normal position
9. Women willing for study

Exclusion criteria

1. Multigravida
2. Multiple foetal gestation
3. Breech and other abnormal presentation
4. Placenta previa
5. Abruptio Placenta
6. Pregnancy <37 completed weeks of gestation
7. Previous LSCS
8. Medical Complications of pregnancy where delivery is urgent
9. Cervical dilatation more than 7 on admission
10. Severe oligo hydramnios
11. Cord prolapse
12. Women not willing for study

Sample size

Assuming a mean (SD) difference in duration of the active phase wall in the groups as 2.4 (1.2) cm, and 2 (0.7) hrs (35) with 95% confidence interval, and 80% power the calculated sample size for the study is 95. Considering a nonresponse rate of 5%, the final sample size of the study is 100 per group.

Sampling technique

The sampling technique used for the present study was a convenient sampling technique. All the eligible patients satisfying the inclusion criteria were selected. Primigravidae received an antenatal check-up and were delivered in the selected hospital and were included till the required sample size was achieved.

Data collection

Data collection period was two years. The investigator introduced themselves and established a good rapport with the study participants. The desire for conducting the study was explained to them. It was assured to them that all data would be kept strictly confidential and used only for the study purpose. After obtaining written consent from the participant, the investigator conducted an interview for collecting information on sociodemographic and clinical characteristics. A pretested semi-structured questionnaire was used to assess the sociodemographic and clinical characteristics. Patients' case records were reviewed to get the details of their treatment history. All the women in the study were followed up till delivery to measure the

outcomes. All of the ladies were nulliparous and above 37 weeks pregnant. Women who experienced a spontaneous commencement of labour and achieved a cervical dilation of less than 4cm were placed in the spontaneous labour group, whereas those who were vaginally induced with 25 mcg of misoprostol and reached a cervical dilation of less than 4 cm were placed in Induced labour group.

Results

Table 1: Distribution of Onset of labour (N=200)

Onset of Labour	N	%
Induced	100	50
Spontaneous	100	50
Total	200	100

The total sample size used in the current study is 200. Of which, 50% were induced and 50% were spontaneous deliveries.

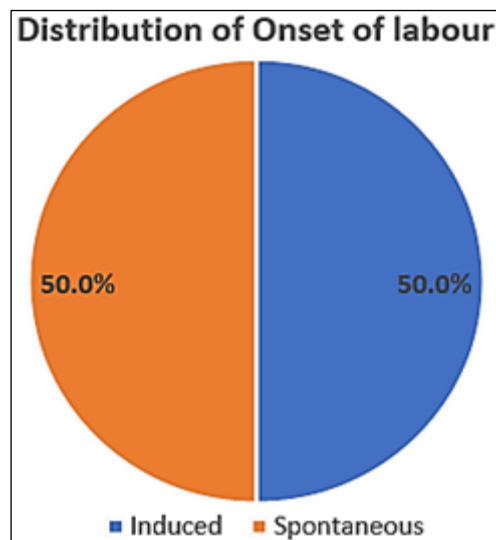


Fig 1: Distribution of Onset of labour

Table 2: Difference in age (N=200)

Onset of labour	Total	Age		Mean diff	t	p
		Mean	SD			
Induced	100	23.7	3.5	1	1.80	.059
Spontaneous	100	24.7	3.9			

The mean (SD) age of the participants are depicted in Table 2. The mean age of women in the induced labour was 23.7 and in spontaneous was 24.7 years.

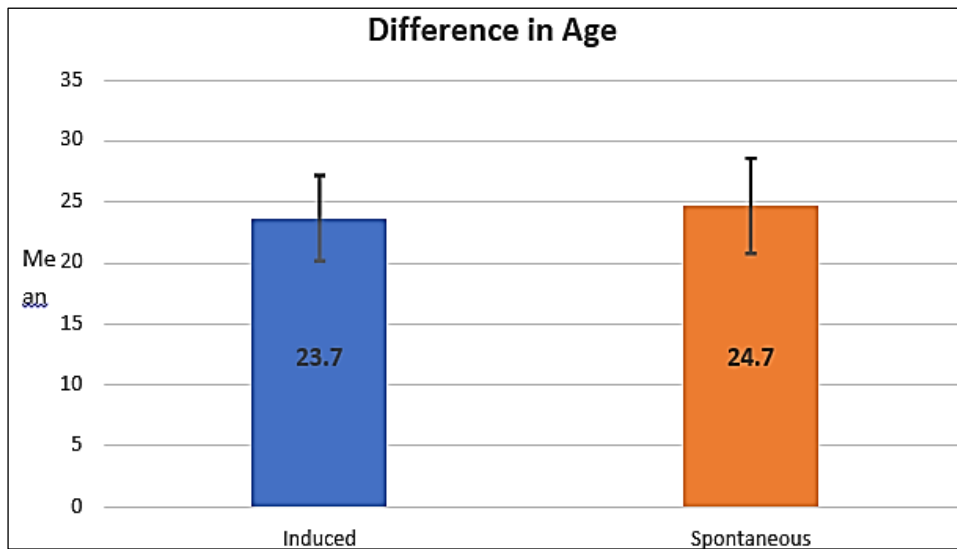


Fig 2: Difference in age

Table 3: Distribution of age categories (N=200)

Age	Induced		Spontaneous		P-value
	n	%	n	%	
<25	71	71.0	59	59.0	0.096
25-30	27	27.0	34	34.0	
>30	2	2.0	7	7.0	

The comparison of the age of the participants is depicted in Table 3. About 71% in the induced group and 59% in the spontaneous group were aged less than 25 years and 27% and 34% were in the age group 25-30. There was no significant difference in age between the groups.

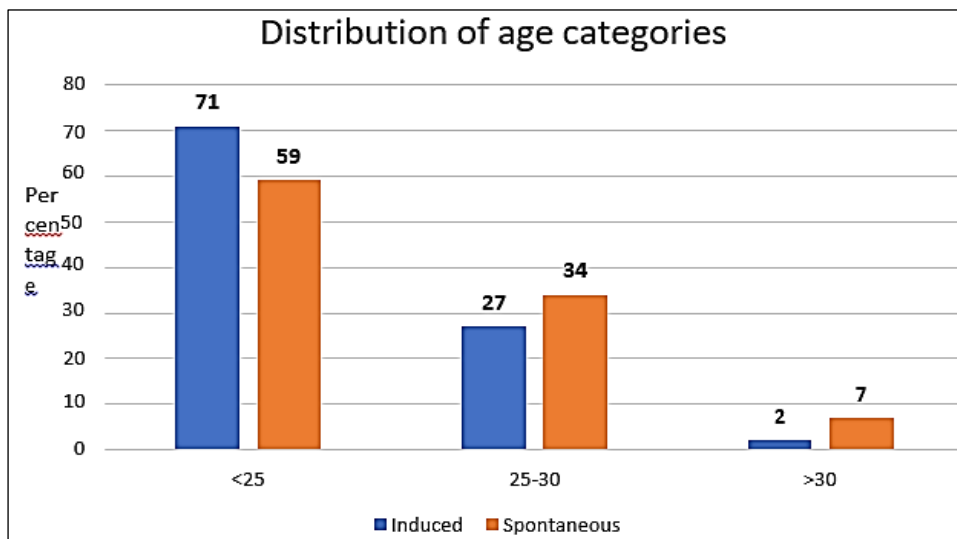
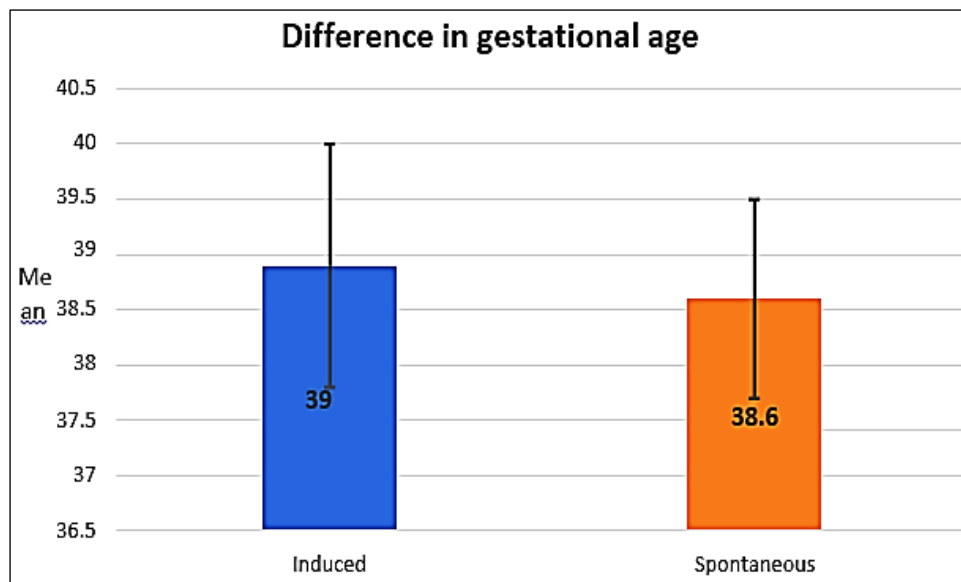


Fig 3: Distribution of age categories

Table 4: Comparison of gestational age (N=200)

Onset of labour	Total	G	A	Mean diff	t	p
		Mean	SD			
Induced	100	38.9	1.1	0.38	1.8	0.061
Spontaneous	100	38.6	0.9			

The mean (SD) gestational age of the participants are depicted in Table 4. The mean gestational age of women in the induced labour was 39 and in spontaneous was 38.6 weeks.

**Fig 4:** Comparison of gestational age**Table 5:** Distribution of parity (N=200)

Parity	Induced		Spontaneous		P-value
	n	%	n	%	
Primi	100	100	100	100	1
Multi	0	0	0	0	

The comparison of the parity of the participants is depicted in Table 5. About 100% in the induced group and 100% in the spontaneous group were primipara.

Table 6: Distribution of PROM (N=200)

PROM	Induced		Spontaneous		P-value
	n	%	n	%	
Yes	5	5.0	7	7.0	0.552
No	95	95.0	93	93.0	

The comparison of the PROM of the participants is depicted in Table 6. About 95% of the induced group and 93% in the spontaneous group had PROM. There was no significant difference in PROM between the groups.

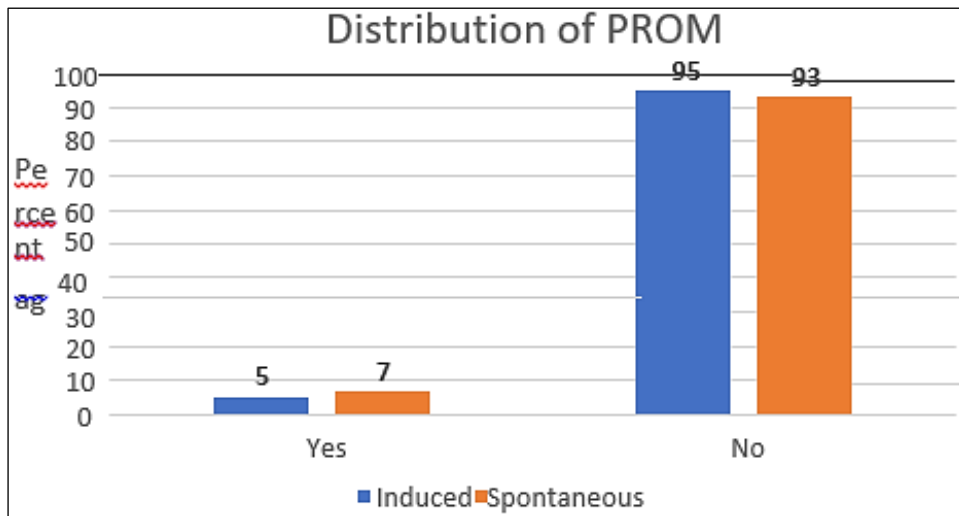


Fig 5: Distribution of PROM

Table 7: Distribution of need for blood transfusion (N=200)

Need for blood transfusion	Induced		Spontaneous		P-value
	n	%	n	%	
Yes	7	7.0	4	4.0	0.612
No	93	93.0	96	96.0	

The comparison of the need for blood transfusion of the participants is depicted in Table 7. About 93% of the induced group and 96% in the spontaneous group had no need for blood transfusion. There was no significant difference in need for blood transfusion between the groups.

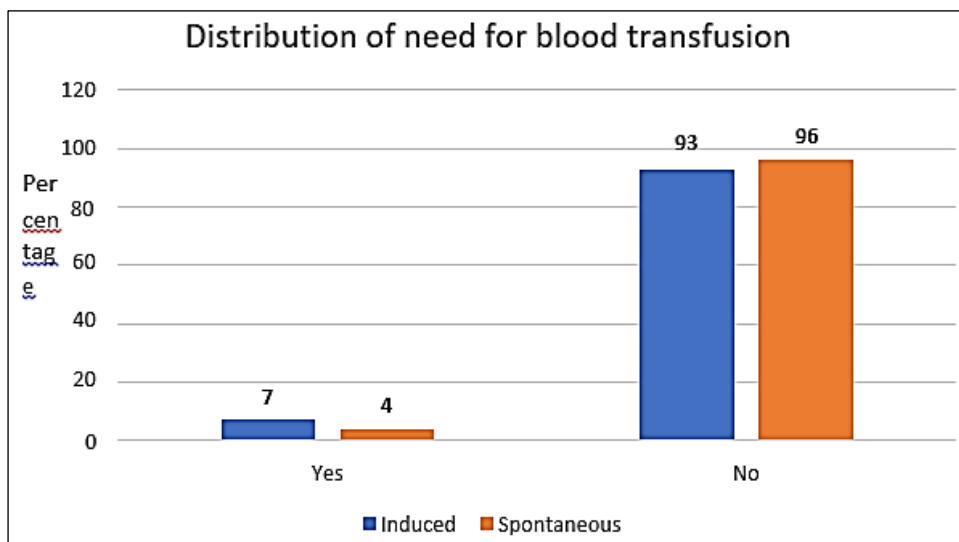


Fig 6: Distribution of need for blood transfusion

Table 8: Comparison of cervical dilation (N=200)

Onset of labour	Total	Dilation (fingers)		Mean diff	t	p
		Mean	SD			
Induced	100	2	0.56	1.67	11.6	<0.001
Spontaneous	100	4	1.3			

The mean (SD) dilation of the participants are depicted in Table 8. The mean dilation of women in the induced labour was 2 fingers and in spontaneous was 4 cms.

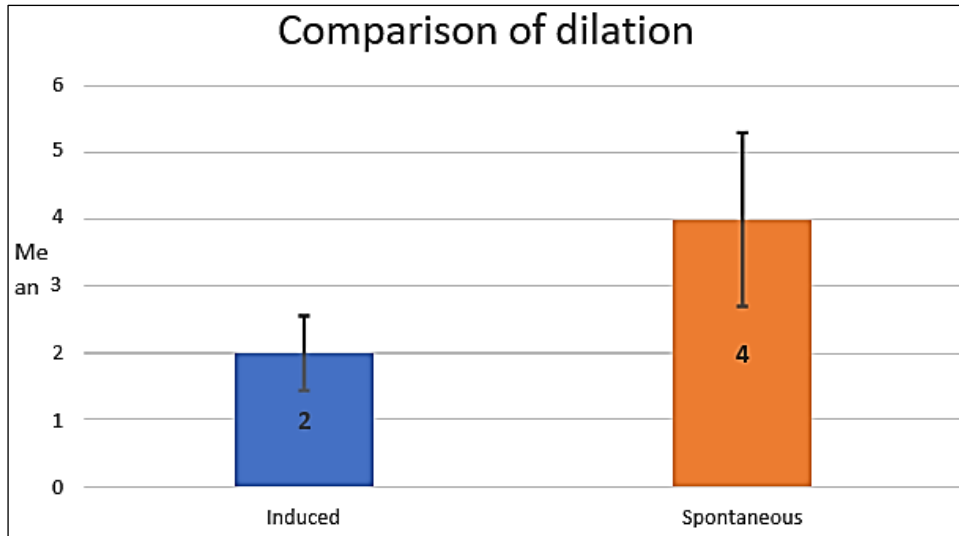


Fig 7: Comparison of cervical dilation

Table 9: Comparison of duration of active phase (N=200)

Onset of labour	Total	Duration (hrs)		Mean diff	t	p
		Mean	SD			
Induced	100	12.1	8.6	7.4	8.2	<0.001
Spontaneous	100	4.6	2.2			

The mean (SD) duration of the active phase of the participants are depicted in Table 9. The mean duration of the active phase of women in the induced labour was 12.1 and in spontaneous was 4.6 hours.

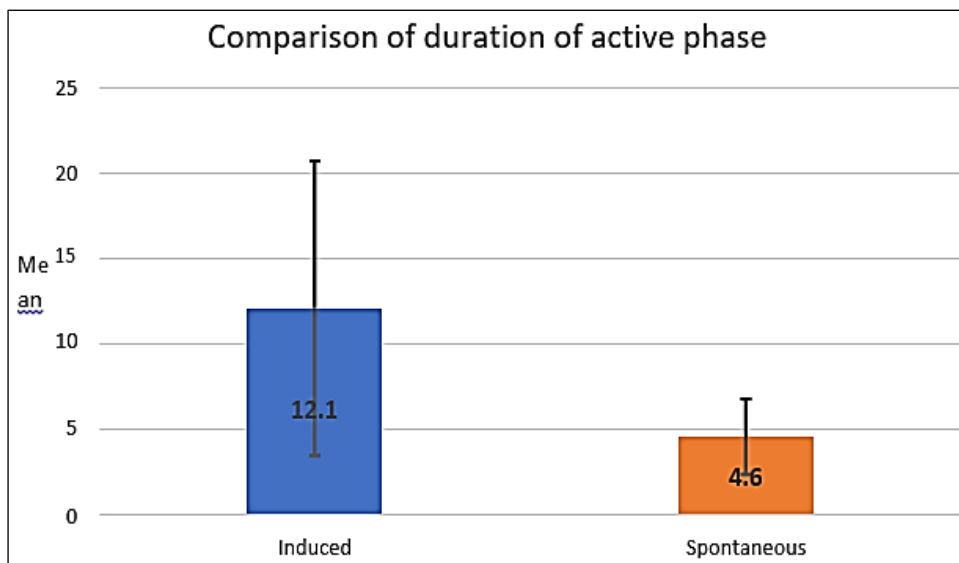
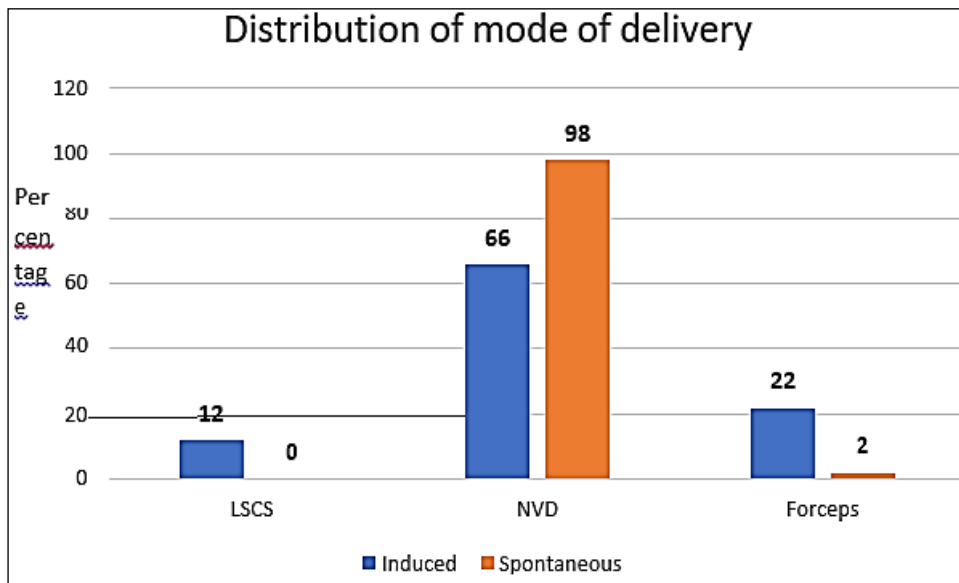


Fig 8: Comparison of duration of active phase

Table 10: Distribution of mode of delivery (N=200)

Mode	Induced		Spontaneous		P-value
	n	%	n	%	
LSCS	12	12.0	0	0	<0.001
NVD	66	66.0	98	98.0	
Forceps	22	22.0	2	2.0	

The comparison of the mode of delivery of the participants is depicted in Table 9. About 66% in the induced group and 98% in the spontaneous group were normal vaginal delivery. 12% of the induced group was LSCS. There was a significant difference in the mode of delivery of the women between the groups.

**Fig 9:** Distribution of mode of delivery**Table 11:** Distribution of indication for LSCS (N=12)

Indication for LSCS	Induced		Spontaneous		P-value
	n	%	n	%	
Fetal distress	5	42.1	0	0	-
MSL with poor bishop score	5	42.1	0	0	
Non progression of labour	2	15.8	0	0	

The comparison of the indication for LSCS of the participants is depicted in Table 11. About 42% in the induced group had MSL as the indication for LSCS.

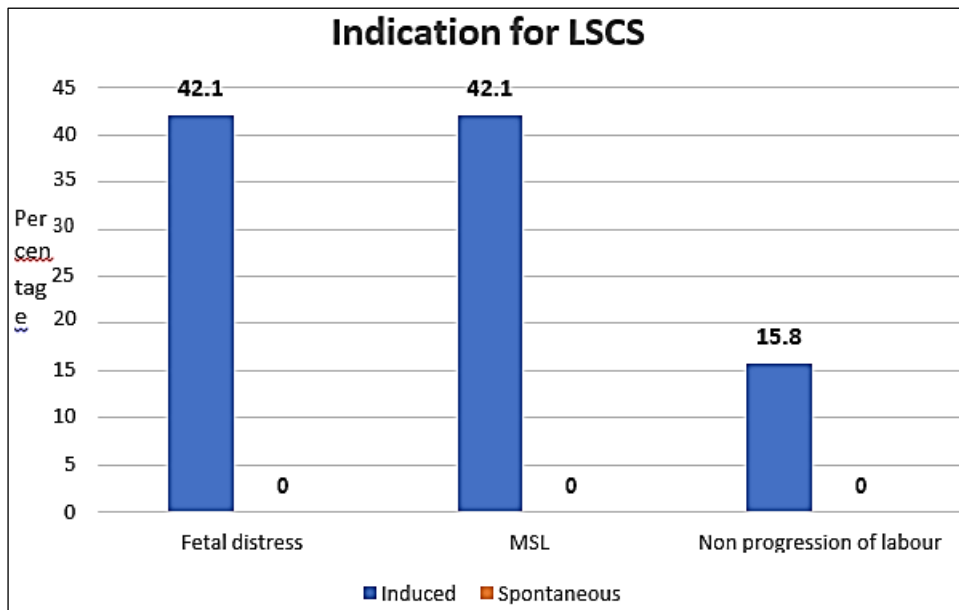


Fig 10: Distribution of indication for LSCS

Table 12: Distribution of PPH (N=200)

PPH	Induced		Spontaneous		P-value
	n	%	n	%	
Yes	58	58.0	10	10.0	<0.001
No	42	42.0	90	90.0	

The comparison of the PPH of the participants is depicted in Table 12. About 58% in the induced group and 10% in the spontaneous group had PPH. There was a significant difference in PPH between the groups.

Table 13: Distribution of AFI (N=200)

AFI	Induced		Spontaneous		P-value
	n	%	n	%	
5	14	14.0	12	12.0	0.721
6	50	50.0	52	52.0	
7	20	20.0	23	23.0	
8	16	16.0	13	13.0	

The comparison of the AFI of the participants is depicted in Table 13. About 50% in the induced group and 52% in the spontaneous group had AFI of 6. There was no significant difference in AFI between the groups.

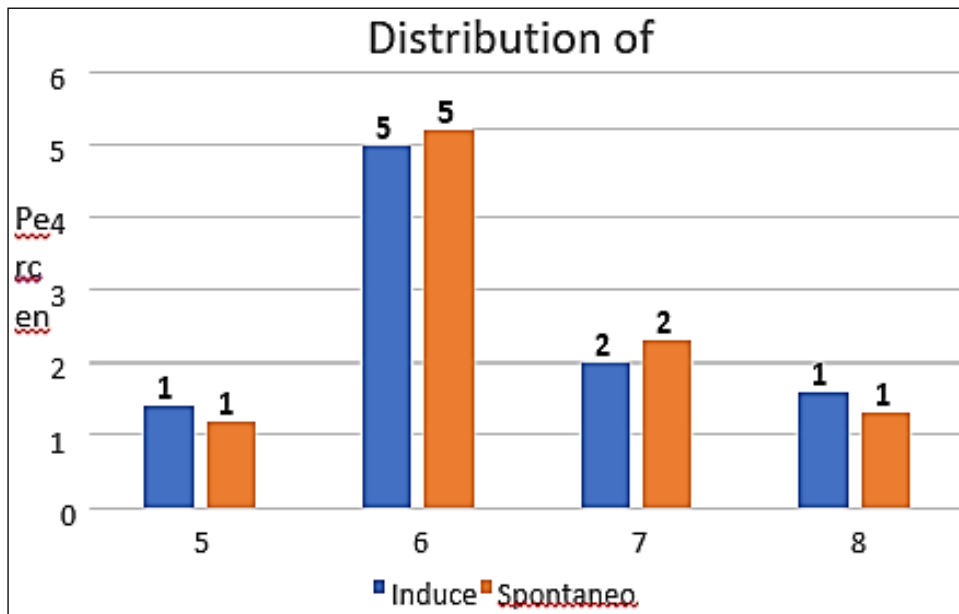


Fig 11: Distribution of AFI

Table 14: Distribution of APGAR at 1 minutes (N=200)

APGAR at 1 minutes	Induced		Spontaneous		P-value
	n	%	n	%	
<8	10	10	10	10	1
>8	90	90	90	90	

The comparison of the APGAR score at 1 minute of the participants is depicted in Table 13. About 90% of the induced group and the spontaneous group had APGAR scores of >8 at 1 minute. There was no significant difference in APGAR score at 1 minute between the groups.

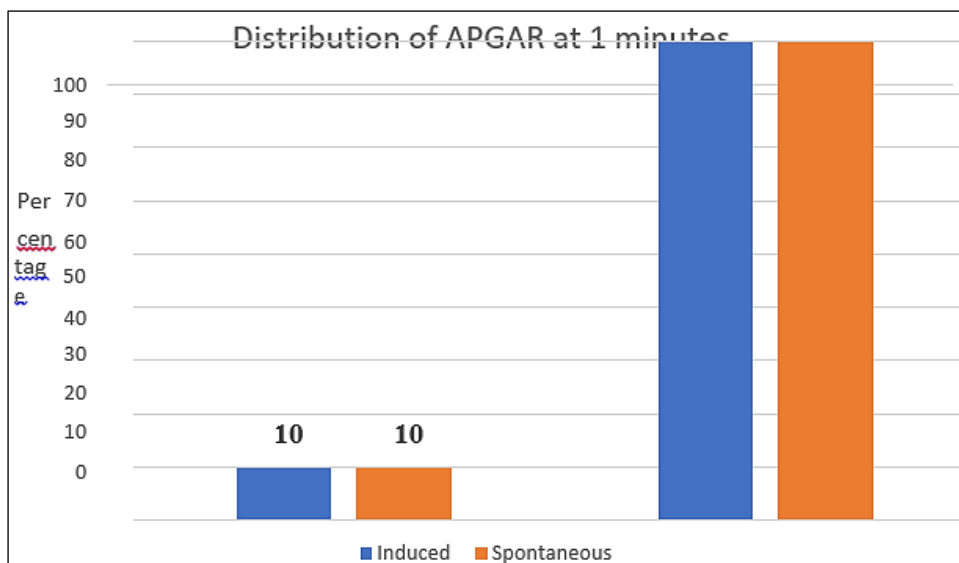


Fig 12: Distribution of APGAR at 1 minutes

Table 15: Distribution of APGAR at 5 minutes (N=200)

APGAR at 5 minutes	Induced		Spontaneous		P-value
	n	%	n	%	
<8	5	41.7	7	58.3	0.552
>8	95	50.5	93	49.5	

The comparison of the APGAR score at 5 minutes of the participants is depicted in Table 15. About 95% of the induced group and 93% in the spontaneous group had APGAR scores of > 8 at 5 minutes. There was no significant difference in APGAR score at 5 minutes between the groups.

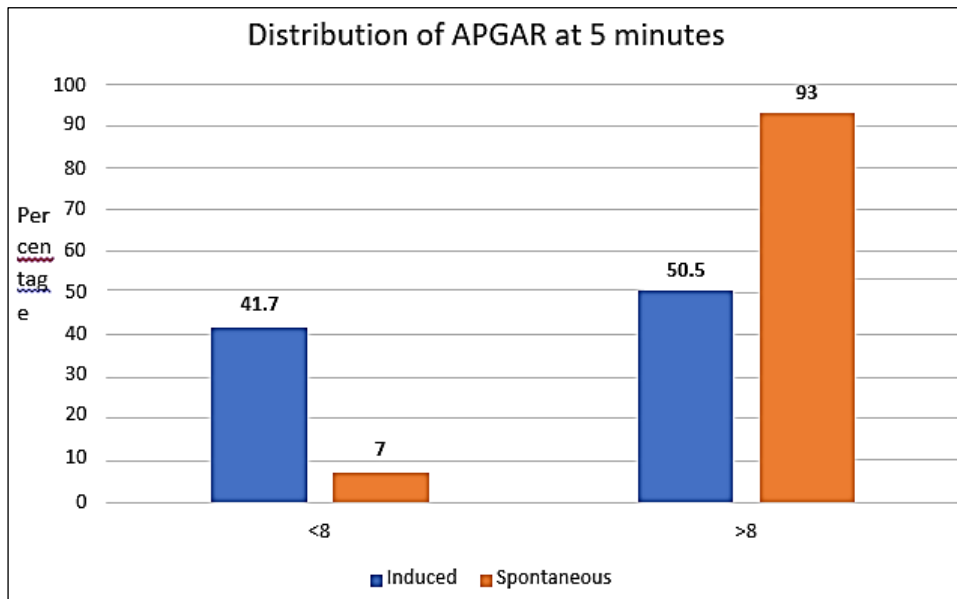


Fig 13: Distribution of APGAR at 5 minutes

Table 16: Distribution of complications (N=200)

Complications	Induced		Spontaneous		P-value
	n	%	n	%	
Yes	8	72.7	4	66.6	0.793
No	3	27.3	2	33.4	

The comparison of the complications is depicted in Table 16. About 73% of the induced group and 67% in the spontaneous group had complications. There was no significant difference in complications between the groups.

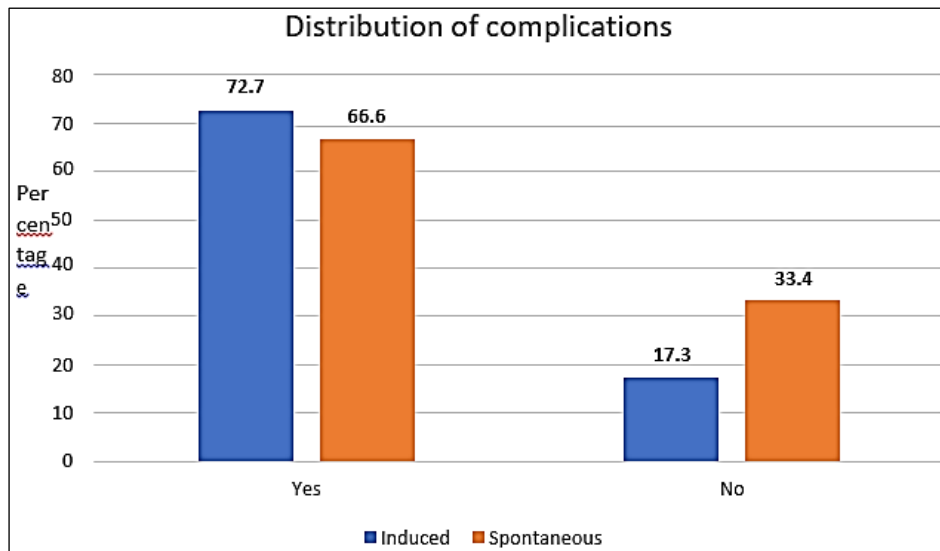


Fig 14: Distribution of complications

Table 17: Comparison of birth weight (N=200)

Birth weight	Total	Duration (hrs)		Mean diff	t	p
		Mean	SD			
Induced	100	2.8	0.4	0.06	1.04	0.299
Spontaneous	100	2.9	0.4			

The mean (SD) birth weight of the participants are depicted in Table 17. The mean birth weight of babies born for women in the induced labour was 2.8 and in spontaneous was 2.9 kgs.

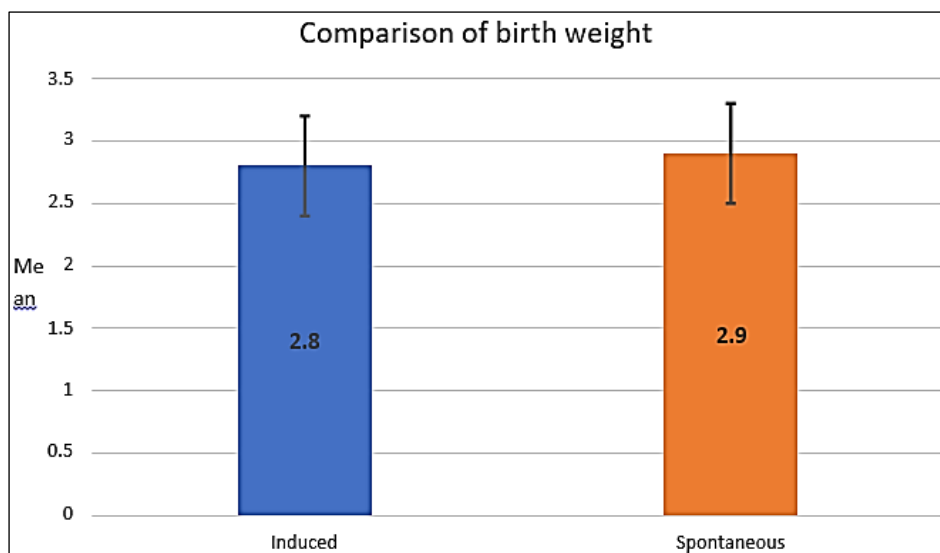


Fig 15: Comparison of birth weight

Table 18: Distribution of NICU admission (N=200)

NICU admission	Induced		Spontaneous		P-value
	n	%	n	%	
Yes	24	24.0	12	12.0	0.027
No	76	76.0	88	88.0	

The comparison of the NICU admissions depicted in Table 18. About 24% of the induced group and 12% in the spontaneous group had NICU admissions. There was a significant difference in NICU admissions between the groups.

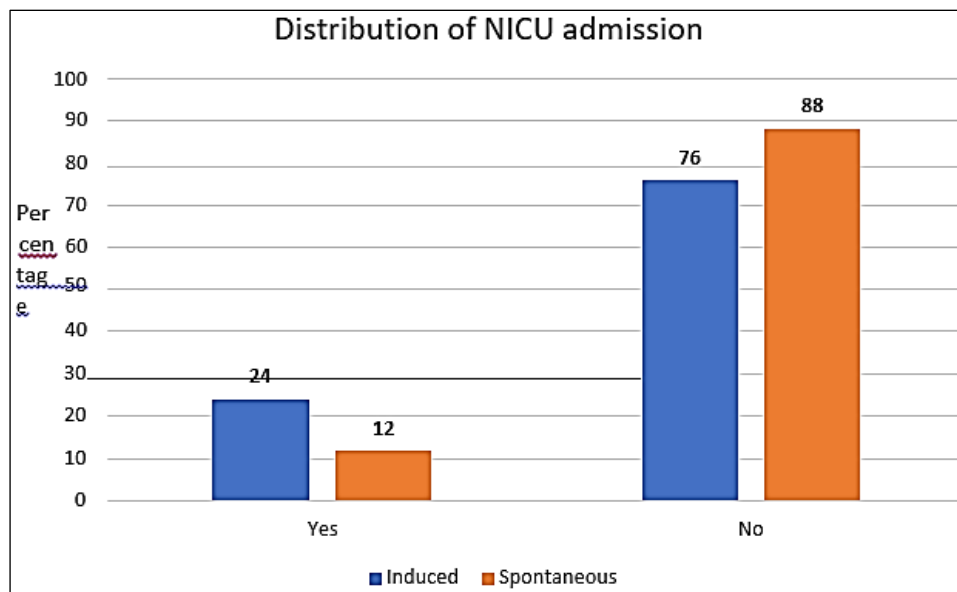


Fig 16: Distribution of NICU admission

Discussion

There are many factors that can contribute to the decision of whether or not to induce labour in a primiparous woman. Some of these factors include the age of the mother, the health of the mother and baby, and the length of the pregnancy. If the mother is young and healthy, and the pregnancy is full-term, induction may not be necessary. However, if the mother is older, or if there are concerns about the health of the mother or baby, induction may be recommended. Each situation is unique and the decision to induce labour should be made on a case-by-case basis. There are many controversies surrounding the induction of labour. Some people believe that it is a necessary medical intervention, while others believe that it is a dangerous intervention that can lead to complications. There is also a debate about whether induction of labour is ethical. Some people believe that it is a form of exploitation of women's bodies, while others believe that it is a necessary medical intervention [15-17].

There are several factors that can contribute to spontaneous labour, including the baby's head engaging in the pelvis, the mother's water breaking, and the mother's cervix beginning to dilate. In some cases, spontaneous labour may be induced by medical interventions such as membrane stripping. However, in most cases, spontaneous labour is a natural process that does not require any medical intervention [18, 19].

The mean age of women in the induced labour was 23.7 and in spontaneous was 24.7 years. About 71% in the induced group and 59% in the spontaneous group were aged less than 25 years and 27% and 34% were in the age group 25-30. There was no significant difference in age between the groups. These findings are in line with the studies conducted in various parts of the world. Thus, age and gestational age had less role in induced labour [20, 21].

The mean gestational age of women in the induced labour was 39 and in spontaneous was 38.6 weeks. The mean dilation of women in the induced labour was 2 fingers and in spontaneous was 4 cms. In our study, the mean duration of the active phase of women in the induced labour was 12.1 and in spontaneous was 4.6 hours. In comparison to women who gave spontaneous delivery, we found that the active phase of labour lasted longer in women who had an induced delivery. Although it is thought that the indication of induction will have

an impact on case are a section rates, labour duration may also be impacted by confounding factor. In our analysis, only the induction caused by pre term membrane rupture in nulliparous women deviated significantly from other explanations [22-24].

Although they were initiated during the active phase and should be viewed as mediators rather than confounders, epidural analgesia and oxytocin augmentation may have an impact on duration. It is challenging to research the value of oxytocin augmentation and epidural analgesia since sluggish progresses assign that these the rapies should be started. There was significant difference in the mode of delivery of the women between the groups. Our findings were in line with those of the study conducted by Orji E O *et al.*, who came to the conclusion that more women in the spontaneous group gave birth vaginally compared to those in the induced group and that there were fewer caesarean sections performed on spontaneous group members. In research by Alyasin ZT *et al.*, they compared elective labour induction with naturally occurring labour in post-dated pregnancies and concluded that the rate of caesarean sections was higher in the induced group. In research by Jankiraman V. *et al.*, they concluded that induced nulliparous women had a higher risk of cases are an sections than women who gave birth naturally [25-28].

In contrast to the groups that underwent inductions, women who went in to labour spontaneously had a higher likelihood of having a vaginal birth. This supported prior research by Sagarika and Lakshmi in which patients who had been given artificial labour had a caesarean section rate of roughly 31%. The rate of caesarean sections is higher when induction is used for unrecognized causes, according to research by Grivell *et al.*, [13].

The probability of a caesarean birth is five times higher for nulliparous women, according to research by Roos *et al.* According to Jonsson *et al.*, electively inducing labour increased the chance of caesarean section by more than three times when compared to spontaneous labour commencement. In our study, patients who had induced labour had a nearly seven-fold higher chance of having caesarean section than patients who went into spontaneous labour because there was a higher risk of foetal distress, MSL, and induction failure [29]. About 42% in the induced group had foetal distress or MSL as the indication for LSCS. Previous studies reported that up to 20% of term births experience meconium passage prior to delivery, making MSAF a common finding with a frequency of one per every five deliveries. Nevertheless, despite how frequently it occurs, it may severely upset obstetricians since it frequently leads to poor foetal out comes and increases the frequency.

In the present study, about 58% in the induced group and 10% in the spontaneous group had PPH. There was a significant difference in PPH between the groups. About 50% in the induced group and 52% in the spontaneous group had AFI of 6. There was no significant difference in AFI between the groups [29-31].

90% of the induced group and the spontaneous group, respectively, had APGAR scores of >8 at 1 minute, according to our study. At one minute, there was no discernible difference in the groups' APGAR scores. The induced group had higher APGAR scores at one and five minutes than the spontaneous group, according to studies by Orji EO *et al.* [32, 33]. Similar circumstances involving maternal issues existed in both groups. Similar to our study, Alyasin ZT *et al.*, investigation's found no discernible changes between the spontaneous and induced groups. In a different trial, Kudagi LB *et al.* looked at the efficiency of intra-vaginal misoprostol with intracervical dinoprostone gel for labour induction and found no obvious distinction between the two groups' outcomes.

In this study, about 95% of the induced group and 93% in the spontaneous group had APGAR scores of > 8 at 5minute. There was no significant difference in APGAR score at 5 minutes between the groups. The new-born APGAR score, which gauges a delivery's success, was evaluated. The infant in the spontaneous group had a mean APGAR score of around 8.1, whereas the new born in the induced group had a mean APGAR score of 7, indicating that the new born in the spontaneous group had a higher score. Therefore, compared to spontaneous

labour, there is a high correlation between the caesarean delivery rate and induction of labour when both maternal and foetal outcomes are considered. The risk of perinatal morbidity and death was not raised by induction [34].

The method of induction, together with careful monitoring of the mother and foetus during the intrapartum phase, is critical to the result [35, 36].

In this study, about 73% of the induced group and 67% in the spontaneous group had complications. There was no significant difference in complications between the groups. Predictions of prenatal weight are typically inaccurate, which can make many women anxious and lead to more inductions than required. Nevertheless, the results of inducing labour for suspected foetal macrosomia include lower mean birth weights, fewer birth fractures, and less shoulder dystocia [37-39].

Current study shows that, about 24% of the induced group and 12% in the spontaneous group had NICU admissions. There was a significant difference in NICU admissions between the groups. These findings are similar to many other studies conducted [40]. Comparable to research by Stock S J *et al.*, [41] that found that elective induction of labour increased NICU admissions by 8% compared to 7.3% in expectant management. The differences in the research environment and sample size may be the cause of the inconsistent outcomes. Hyperbilirubinemia was the most frequent reason for admission and was nearly same in both groups.

Conclusion

Women in induced labor experienced longer active phases on average than those in spontaneous labor. 98% of deliveries in the spontaneous group and 66% of deliveries in the induced group were normal vaginal births; LSCS was present in 12% of the induced group. Between the groups, there was a sizable variation in NICU admissions. Induction of labor is linked to more caesarean sections due to induction failure and a higher risk for larger induction delivery intervals in contrast to spontaneous labor, in addition to neonatal issues such as an increased rate of NICU admissions and fetal deaths. Therefore, induction should only be performed when continuing the pregnancy will put the mother or the unborn child at much greater risk. This may be done by carefully evaluating the maternal and foetal status and confirming the appropriate indications. Also, Measures should be taken to reduce the NICU admissions for induced labour women by vigilant monitoring and early decisions.

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