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Nulliparous Women: Examining Fetal and Maternal Outcomes in Induced versus Spontaneous Labor

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ABSTRACT

Introduction: The goal of modern obstetrics is to enhance feto-maternal health. In certain cases, interventions are required to safeguard it. The most frequent interventional procedure is currently induction of labour. This study was conducted to assess feto-maternal outcome in induced women in comparison to spontaneous labour in nullipara.

Methodology: This was a prospective study conducted among 55 nulliparous pregnant women at or beyond 37 weeks of gestation who were in need of induction. Progress of labour was monitored with modified WHO partograph. All consecutive patients who entered into spontaneous labour (n=55) were also included.

Results: Mean cervical dilatation in 'spontaneous labour' group was 4.48 (± 0.65) cm and in 'induction labour' group was 4.4 (± 0.62) cm. In 'spontaneous labour' group, 36.4% required augmentation whereas in 'induction labour' group 67.3% required. In former, 81.8% had normal vaginal deliveries, whereas 63.6% in the later group. Mean duration of first stage of labour in 'spontaneous labour' group was 11.42 (± 2.32) hours and in 'induction labour' group was 10.36 (± 2.78) hrs. The rate of maternal complication was significantly more in 'induction labour' group compared to 'spontaneous labour' group. There was no significant difference in neonatal outcome in new-born in both the study groups.

Conclusion: Induction of labour is associated with higher rate of LSCS. Duration of first stage of labour is significantly shorter in induced women, however duration of second and third stage of labour was almost similar to spontaneous labour. Induction of labour is a safe procedure.

INTRODUCTION

The time between the start of a regular uterine contraction and the placenta being expelled is known as childbirth. This usually happens through a process known as labour. [1] According to the WHO, a normal birth is one that is spontaneous in onset, low risk when labour begins, and remains low risk the whole-time labour is in progress. Between 37 and 42 full weeks of pregnancy, the baby is born naturally in the vertex position, and both mother and child recover well from the delivery. [2]

Three objectives must be met for induction of labour to be effective. First, it should cause labour, which entails sufficient uterine contractions and in-

creasing cervical dilation. Second, this labour should end in a vaginal birth because it serves no useful purpose to induce labour just to prepare for a caesarean section. Third, these goals must be accomplished in viable pregnancies with the least amount of discomfort and danger to both the mother and the foetus.

The first WHO partograph, also known as the "Composite partograph," includes both the latent phase of labour, which can last up to 8 hours, and the active phase, which starts when the cervical dilation reaches 3 cm. As tools for monitoring labour, the partograph is equipped with an alert line and an action line that are drawn four hours apart. This partograph is based on the idea that cervical dilatation shouldn't go more slowly than 1 cm per hour during active labour. A four-hour delay between the slowing of labour and the necessity for intervention reduces the risk of harm to the mother or the foetus and prevents inappropriate intervention.

Additionally, because it is challenging to distinguish between the latent period and false labour, diagnoses are frequently established after the fact. [3] In order to address these drawbacks, the WHO "Modified Partograph" was established, which eliminated the latent phase and considered the start of the active phase to occur at a cervical dilation of 4 cm as opposed to 3 cm. Other minor adjustments included the cervical dilatation curve being calculated using two squares per hour rather than just one. [4]

The partograph was updated once again by WHO, this time for use in health centres by qualified staff members. This color-coded partograph is simplified. The cervicograph's region to the left of the alert line is coloured green to indicate normal progress. A red region to the right of the action line indicates labour is moving at a dangerously sluggish pace. The region between the alert and action lines is highlighted in amber, calling for more caution. [5]

The study's goals were to examine the progression of labour in nulliparous women who are experiencing induced labour as well as spontaneous labour in terms of labour augmentation, method of delivery, infant outcome, and maternal complications.

MATERIALS AND METHODS

This was a Prospective, Interventional and Comparative study conducted among pregnant women at or beyond 37 weeks of gestation attending a tertiary care hospital in Gujarat during Jan 2021 to Jule 2022. Total 100 pregnant women selected after taking into consideration selection criteria.

Eligibility criteria: The pregnant women with nulligravida, vertex presentation, completed 37 weeks, spontaneous true labor pain, in need for induction of labor and having reactive fetal heart rate pattern were included in the study. Any pregnant women with primigravida, breech and other abnormal presentation, placenta previa, abruptio placenta, pre term, previous LSCS, medical complications of pregnancy where delivery was urgent, cervical dilatation more than 7 on admission, severe oligohydramnios, cord prolapse or no trial of labor were excluded from the study.

After the approval from Obstetrics and Gynecology departmental committee and university ethical committee, an informed consent of participation was taken from the patients. The study was conducted at Dhiraj Hospital.

When a pregnant patient comes in our outpatient department, admitted in the ante-natal ward or labour room, detailed history and thorough clinical examination of each patient was carried out. After this, antenatal package of investigations was sent.

Comparative study involving women in spontaneous labour versus those induced with Oxytocin PGE2 gel and PGE1.

Basic assessment for risk factors was done in antenatal patients with spontaneous onset of labour and if the patient comes under uncomplicated term gestation she was included in the study. Women were included in the study group if their gestational age was at least 37 weeks at admission to labour, carried a singleton pregnancy in vertex presentation and had a reactive fetal heart rate pattern.

Women in pre-term labour with other obstetric and medical complication requiring emergency delivery were excluded. Detailed antenatal history followed by basic pelvic assessment was done and reactive FHR pattern is assessed.

Progress of labour was monitored with modified WHO partograph. The need for further acceleration of labour was decided based on the partograph.

All consecutive patients who entered into spontaneous labour were included in the study similarly after exclusion all consecutive women admitted for induction was chosen. After obtaining informed consent they were induced with Oxytocin, PGE2 gel or PGE1.

It’s association with maternal outcome (Mode of birth, duration of labor, operative vaginal birth, per-

ineal trauma, prolonged labour, postpartum haemorrhage, etc.) and fetal outcomes **(**Perinatal mortality, birth asphyxia, meconium aspiration syndrome, admission to neonatal intensive care unit, Apgar score, etc.) were assessed.

Statistical analysis: The result was recorded and tabulated. The results were statistically analyzed using parameters like mean, standard deviation and chi square test.

Ethical considerations: The study protocol was approved by the "Institutional Ethics Committee". Informed written consent was obtained before enrollment of each and every case in the study.

RESULTS

The age profile and duration of gestation at the time of admission were mentioned in table 1. In both the group most of the women were between 21 to 30 years of age. There was no significant difference in age distribution and gestational age of women in both the study groups.

Table 2 shows comparison progress of labour and maternal outcome in both the study groups. Mean cervical dilatation in 'spontaneous labour' group was 4.48 (± 0.65) cm and in 'induction labour' group was 4.4 (± 0.62) cm. Mean descent of head in 'spontaneous labour' group was 3.33 (± 0.48) and in 'induction labour' group was 3.2 (± 0.44). There was no significant difference in cervical dilatation and head position in both the study groups when the patients were reported for labour. In 'spontaneous labour' group out of 55 cases, 20 (36.4%) were required augmentation where in 'induction labour' group it was 37 (67.3%). Requirement of augmentation was significantly more in 'induction labour' group compared to 'spontaneous labour' group. There was no significant difference in labour progress according to partograph in both the study groups during the delivery.

In the "spontaneous labor" group, 45 (81.8%) of the 55 cases had normal vaginal deliveries, whereas 35 (63.6%) in the "induction labor" group. Out of 55 cases, 7 (12.7%) had LSCS in the "spontaneous labor" group, whereas 17 (30.9%) had it in the "induction labor" group. This indicated that cases requiring LSCS were significantly higher in 'induction labour' group compared to cases requiring LSCS in 'spontaneous labour' group.

Mean duration of first stage of labour in 'spontaneous labour' group was 11.42 (± 2.32) hrs and in 'induction labour' group was 10.36 (± 2.78) hrs. Mean second stage labour in 'spontaneous labour' group was 55.43 (± 8.15) min and in 'induction labour' group was 57.37 (± 7.01) min. Mean third stage labour in 'spontaneous labour' group was 5.43 (± 1.34) min and in 'induction labour' group was 5.12 (± 2.39) min. Mean duration of first stage of delivery was significantly lower in 'induction labour' group. However, there was no significant difference in duration of second and third stages of labour ($p > 0.05$). The rate of complication was significantly more in 'induction labour' group compared to 'spontaneous labour' group.

Table 3 shows fetal outcome in both the study groups. In the "spontaneous labour" group, 32 (58.2%) of the 55 cases had a 2500–3000 g birth weight, whereas 34 (61.8%) were in the "induction labour" group. In the "spontaneous labour" group, 11 (20%) of the 55 cases had a >3000 g birth weight, whereas 12 (21.8%) were in the "induction labour" group. There was no significant difference in birth weight of babies in both the study groups.

Application of test of significant for APGAR score at 1 minute and 5 minute indicated p value of >0.05 which was not significant, thus, there was no significant difference in APGAR score at 1 min and 5 min in both the study groups. There was no significant difference in neonatal outcome in new-born in both the study groups.

Total 12 patients received oxytocin for induction in whom mean duration of first stage was 11.06 hours (± 3.02) and second stage was 255.72 min (± 6.84). Total 13 patients received PGE1 for induction in whom mean duration of first stage was 10.51 hours (± 2.11) and second stage was 53.84 min (± 8.32). Total 30 patients received PGE2 for induction in whom mean duration of first stage was 10.02 hours (±2.23) and second stage was 59.09 min (± 6.91). There was no significant difference duration of first and second stage of labour among all three methods of induction.

Table 1: Profile of women included in the study

Study variables	Spontaneous Labour (n=55)	Induced Labour (n=55)	P value
Age			
18-20	3 (5.5%)	4 (7.3%)	
21-25	29 (52.7%)	27 (49.1%)	
26-30	21 (38.2%)	21 (38.2%)	
>30	2 (3.6%)	3 (5.5%)	
Mean ± SD	25.02 ± 3.4	24.89 ± 4.1	**0.856**
GA at the time of labour			
37-38	24 (43.6%)	27 (49.1%)	**0.566**
39-40	31 (56.4%)	28 (50.9%)	

Table 2: Progress of labour and maternal outcome in the study cases

Study variables	Spontaneous Labour (n=55)	Induced Labour (n=55)	P value
At the time of reporting			
Cervical Dilatation (cm)	4.48 ± 0.65	4.4 ± 0.62	0.511
Descent of head	3.33 ± 0.48	3.2 ± 0.44	0.142
Augmentation required			
Yes	20 (36.4%)	37 (67.3%)	<0.001
No	35 (63.6%)	18 (32.7%)	
Labour progress in Partograph			
Reaching or crossing Action line	10 (18.2%)	17 (30.9%)	0.121
Moved between Alert & Action line	16 (29.1%)	8 (14.5%)	
Normal active phase	29 (52.7%)	30 (54.5%)	
Mode of delivery			
LSCS	7 (12.7%)	17 (30.9%)	0.021*
Normal Vaginal	45 (81.8%)	35 (63.6%)	
Vacuum Vaginal	3 (5.4%)	3 (5.5%)	
Duration of Labour			
First stage of labour (hr)	11.42 ± 2.32	10.36 ± 2.78	0.032
Latent Phase	5.02 ± 1.03	4.83 ± 0.89	0.329
Active Phase	3.11 ± 0.78	2.61 ± 0.67	<0.001
Second Stage (min)	55.43 ± 8.15	57.37 ± 7.01	0.184
Third stage (min)	5.43 ± 1.34	5.12 ± 2.39	0.403
Intrapartum complications			
Vomiting	2 (3.64%)	6 (10.91%)	
Hyperstimulation	0 (0%)	5 (9.09%)	
Fever	0 (0%)	2 (3.64%)	
None	53 (96.36%)	44 (80%)	0.007*
Obstetrical Complication			
Perineal tear	2 (3.6%)	4 (7.3%)	0.401
PPH	1 (1.8%)	4 (7.3%)	0.169
Atonic	1 (1.8%)	3 (5.5%)	
Traumatic	0 (0%)	1 (1.8%)	
Cervical tear	0 (0%)	1 (1.8%)	-

Table 3: Fetal outcome in the study cases

Study variables	Spontaneous Labour (n=55)	Induced Labour (n=55)	P value
Birth weight			
<2500 g	12 (21.8%)	9 (16.4%)	0.766
2500-3000 g	32 (58.2%)	34 (61.8%)	
>3000 g	11 (20%)	12 (21.8%)	
Total	55 (100%)	55 (100%)	
Birth weight (g) (Mean ± SD)	2890 ± 304 (0%)	2920 ± 287 (0%)	
APGAR @ 1 min			
<7	9 (16.4%)	11 (20%)	0.621
7 or more	46 (83.6%)	44 (80%)	
APGAR @ 5 min			
<7	2 (3.6%)	4 (7.3%)	0.401
7 or more	53 (96.4%)	51 (92.7%)	
Neonatal outcome			
Healthy	51 (87.3%)	45 (81.8%)	0.086
Still birth	0 (0%)	0 (0%)	-
Cried After Tactile Stimulation	2 (3.6%)	3 (5.5%)	0.31
Cried After Bag and Mask	1 (1.8%)	2 (3.6%)	0.558
Intubated	0 (0%)	1 (1.8%)	-
Shifted To NICU	1 (1.8%)	3 (5.5%)	0.31
Neonatal Death	0 (0%)	1 (1.8%)	-

DISCUSSION

The goal of modern obstetrics is to enhance mother and foetal health. Despite the fact that the majority of women in their reproductive years are in good health and have straightforward deliveries with spontaneous labour onset, however, women, carrying the pregnancy to term poses a certain risk to both the mother and the foetus, necessitating obstetric treatments to improve the fetomaternal prognosis.[6]

The most frequent interventional procedure is currently induction of labour. To facilitate a vaginal birth, labour induction is the intentional inducement of uterine contractions prior to the commencement of labor.[7,8] It requires close supervision because there are risks involved.

In this context to the present study conducted among 110 mothers to study feto-maternal outcome in case of spontaneous and induced labor in cases of multigravida.

Mean cervical dilatation in 'spontaneous labour' group was 4.48 (± 0.65) cm and in 'induction labour' group was 4.4 (± 0.62) cm. According to Yadav P et al (2016) [9], mean cervical dilatation in 'spontaneous labour' group was 4.48±0.65 cm whereas in induced labour it was 4.4±0.62 cm. Mean descent of head in 'spontaneous labour' group was 3.33±0.48 and in 'induction labour' group was 3.2±0.44. There was no significant difference in head position in both the study groups when the patients were reported for labour. This result was comparable with our research. Orji EO et al (2008) [10], found mean cervical dilatation in 'spontaneous labour' group was 4.68 ± 1.001 cm whereas in induced labour it was 4.55 ±0.778 cm. Mean level of head in 'spontaneous labour' group was 3.22 ± 0.875 and in 'induction labour' group was 3.22 ± 0.875.

Requirement of augmentation was significantly more in 'induction labour' group compared to 'spontaneous labour' group. There was no significant difference in labour progress according to partograph in both the study groups during the delivery. Almost similar result like the present study were found in the study by Yadav P et al (2016) [9] where the "induction labour" group required significantly more augmentation.

In present study there was no significant difference in labour progress according to partograph in both the study groups during the delivery. In the study by Yadav P et al (2016) [9], out of 60 cases, 10 (16.7%) were Reaching/crossing action line in spontaneous labour group whereas in induced labour group it was 21 (35%). Significant result observed in study. Similar findings were made in research by Orji EO et al [10].

In present study cases requiring LSCS were significantly higher in 'induction labour' group compared to cases requiring LSCS in 'spontaneous labour' group. In the study by Yadav P et al (2016) [9], there were more vaginal deliveries which was statistically significant. Orji EO et al [10] 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. Alyasin ZT et al [11], conducted a study and they compared elective labour induction with spontaneous onset of labour in post-dated pregnancy and they concluded that rate of caesarean section was more in induced group. In a study done by Jankiraman V et al [12], they concluded that induced nulliparous had increased rate of caesarean section compared spontaneous onset labour.

In present study mean duration of first stage of delivery was significantly lower in 'induction labour' group. However, there was no significant difference in duration of second and third stages of labour. In study by Orji EO et al (2008) [10], There is no significance difference found in the time duration of labour in both the study group.

In present study in either study group, the majority of cases had no intrapartum complications. In the study by Gunakala K et al (2022) [13] also found very few complications during labour. In the present study, there was no significant difference in occurrence of perineal tear, PPH or cervical tear in both the study groups during the delivery.

In the study by Yadav P et al (2016) [9] found no significant difference found in maternal complications. Postpartum haemorrhage complicated more in induced labour cases in the study by Abisowo OY et al (2017) [14]. These figures exceeded Selo-Ojeme et al [15] published values of 2.2% for induced and 1.3% for spontaneous, respectively. In this situation, postpartum haemorrhage was caused by excessive uterine stimulation and an increased risk of uterine atony due to postpartum uterine tiredness brought on by the administration of uterotonic drugs, particularly oxytocin.

In present study in the "spontaneous labour" group, there was no significant difference in birth weight of babies in both the study groups. Similar results were also found by Yadav P et al (2016) [9]. Simi-

larly, the present study found no significant difference in APGAR score at 1 min and 5 min in both the study groups. Similar result observed in the study by Yadav P et al [9], and by Abisowo OY et al (2017) [14].

LIMITATION OF STUDY

Reason for induction of labour has impact on outcome of induction and therefore could have contributed to a higher c-section rate. Psychological factors also influence the failure rate of induction that need to be addressed in the antenatal period. The ideal method of fetal monitoring is fetal scalp pH testing which was not available. This could have been one of the factors affecting outcome of induction.

CONCLUSION

From this study we conclude that induction of labour is associated with higher rate of LSCS. Non-reassuring foetal status is common reason for caesarean delivery in induced group followed by non-progression of Labour. Duration of first stage of labour is significantly shorter in induced women, however duration of second and third stage of labour was almost similar to spontaneous labour. Induction of labour is a safe procedure because Intra partum and post-partum complications very less, almost comparable to spontaneous labour. Cases with hyperstimulation of uterus, perineal tear, PPH and cervical tear are reportedly little more in induced labour group, however, the difference was statistically not significant. Induction of labour is a safe procedure is also safe for baby as neonatal outcome like APGAR Score at 1 min and 5 min, birth weight, NICU admission, still birth, neonatal mortality and other complication are uncommon and almost similar in spontaneous and labour group.

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