

## Comparative Study of Progress of Labour in Spontaneous Versus Induced Labour by Simplified Partograph

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### ABSTRACT

**Objective:** To compare the progress, mean duration, mode of delivery, need for augmentation and fetomaternal outcome in spontaneous versus induced labour by simplified partograph and also to promote the utilization of simplified partograph during labour.

**Methods:** A prospective observational analytical study conducted in tertiary hospital, over 18 months. Total sample size was 300(150 in spontaneous labour-Group A and 150 in induced labour -Group B). Parameters in both groups were compared with Simplified partograph.

**Result:** Vaginal delivery was significantly higher in spontaneous group as compared to induced group (64.7% vs 40.0%). Delivery between Alert & Action line was significantly higher in Induced group as compared to Spontaneous group (51.5% vs 34.5%); delivery before Alert line was significantly higher in spontaneous group as compared to induced group (60.1% vs 39.9%). Different parameters in induced and spontaneous group were compared. Maternal complication (11.3% vs 1.3%), Fetal distress (32.1% vs 17.3%), SNCU admission (28.7% vs 13.3%), Pathological CTG (31.3% vs 19.3%) were found to be higher in the induced group.

**Conclusion:** Partogram is efficient, time saving and gives a clear picture of labour. Induction of labour can be safe among primigravida if labour is partographically monitored.

### Introduction

Labour is a natural physiological process characterized by progressive increase in frequency, intensity and duration of uterine contractions resulting in effacement and dilatation of the cervix with descent of the fetus through the birth canal. This physiological process

may at times become pathological. Failure to recognize would result in prolonged labour with resultant increase in the intensity in the morbidity and mortality of both the fetus and mother. The best way to monitor labour is with the help of a partograph. Any delay or deviation from normal may be detected quickly and treated

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accordingly. As induction has both advantages and disadvantages this study was undertaken to compare the maternal and fetal outcomes of both induced and spontaneous labour using simplified WHO partograph. Partographs when used with defined management protocols is an inexpensive tool which can effectively monitor labour and be helpful in reducing incidences of both maternal and fetal morbidity and mortality by reducing the number of operative interventions, prolonged labour, obstructed labour and caesarean section. The indication of induction of labour must be worthy as likewise being sufficient indications for a caesarean section because if the procedure fails, the end result is caesarean section. Child birth is the period from the onset of regular uterine contraction until expulsion of placenta. To assess the progress of labour and to identify when intervention is necessary partograph can be highly effective in reducing complications from prolonged labour, for both mother & the new-born. The main aim of the study is to compare the mean duration of labour, eventual mode of delivery, requirement of augmentation by oxytocin and their foeto maternal outcome in spontaneous vs induced labour by simplified partograph. Induction of labour is one of the most common procedures during pregnancy. Data from the National Centre for Health Statistics for the last decade indicate that the rate of labour induction has increased gradually from 9% to 20%. This increase has been noted both at community Hospitals and at the university tertiary care hospitals. Indications for induction of labour is post-dated pregnancy, leaking pv, medical disorder in mother, prolonged rupture of membrane etc. The American college of obstetricians and gynecologists practice bulletin "induction of labour" states, generally induction of labour has merit that if any pregnancy has high risk like GDM, prolonged leaking PV, HDP which has high risk to carry the pregnancy further that labour we can induce and terminate the pregnancy; it will be safe for both mother and baby.<sup>1</sup> As the induction have both advantages and disadvantages there is a need to study the progress of labour, maternal and fetal outcomes of both spontaneous and induced labour and to compare them by plotting the partograph. Methods (pharmacological and mechanical) used for induction of labour in the study: Prostaglandin E2[PGE2 gel] (dinoprostone gel), Oxytocin, Foley induction, Artificial rupture of membrane, Stripping of membrane.<sup>2</sup>

## Aims and Objective of Reserch

### *General objective:*

- To monitor spontaneous and induced labour for progress and their fetomaternal outcome in both groups.
- To promote the utilization of simplified partograph during labour.

### *Specific objective:*

- To compare the progress of labour, mean duration of labour, mode of delivery and need for augmentation in spontaneous versus induced labour by simplified partograph.

## Materials and Methods:

This was a prospective observational analytical study conducted in a tertiary care hospital of India from April 2021 to September 2022 with a sample size of 300 after receiving Ethical Committee permission.

### *Inclusion criteria:*

- Pregnant woman in spontaneous and induced labour
- Singleton term pregnancy  $\geq 37$  wks
- Vertex presentation
- Post-term pregnancy
- Premature rupture of membrane
- Preeclampsia, eclampsia
- Gestational hypertension
- Fetal causes (e.g., fetal growth restriction.)

### *Exclusion criteria:*

- Preterm labour less than 37weeks
- Malpresentation
- Malposition
- Multiple pregnancy
- Antepartum haemorrhage
- Contracted pelvis
- Cephalo Pelvic Disproportion
- Previous LSCS
- Obstructed labour

## Methodology

- On admission to the hospital a detailed history about exact time of onset of labour pains or leaking membranes was elicited. Details of menstrual and obstetric history, Family history, past history, personal histories were elicited as in the proforma.

- patients were selected according to the inclusion criteria and studied by using a simplified partogram.
- After an initial preparation of the patient, examination of the patient was carried out. All the vital signs and a detailed systematic evaluation was done. Local examination done.
- Per vaginal examination was done with the interval of 4 hourly.
- The simplified partogram was attached to the mother's case record when the patient was admitted in the labour room.
- This study has two group for comparison.

Group A- Spontaneous labour which progress normally and reached >4cm cervical dilatation. The number of subjects allotted to this group were 150.

Group B- Induced labour where induction was done surgically, medically and mechanically by ARM, PGE2 gel and foleys, stripping of membrane, oxytocin respectively, reached >4cm. The number of subjects allotted to this group were 150.

In our study, the partograph was plotted in both groups. The aim of our study is to provide partographic pictorial overview of labour in both group and compare their progress, duration, mode of delivery, need of oxytocin augmentation and fetomaternal outcome in respect to alert and action line and that was compared analytically.

**Result**

Statistical Analysis was performed with help of Epi Info (TM) 7.2.2.2 EPI INFO is a trademark of the Centres for Disease Control and Prevention (CDC). Statistical analysis was done by SPSS software with p-value being 0.05.

**1. Mode of delivery and the patients of the two groups [Table-1]**

**Table-1: Mode of delivery and the patients of the two groups**

Mode of delivery	Spontaneous	Induced	TOTAL
CS	42	72	114
Row %	36.8	63.2	100.0
Col %	28.0	48.0	38.0
NVD	97	60	157
Row %	61.8	38.2	100.0
Col %	64.7	40.0	52.3

Mode of delivery	Spontaneous	Induced	TOTAL
Outlet Forceps	5	11	16
Row %	31.3	68.8	100.0
Col %	3.3	7.3	5.3
Ventouse	6	7	13
Row %	46.2	53.8	100.0
Col %	4.0	4.7	4.3
TOTAL	150	150	300
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

Proportion of NVD was significantly higher in spontaneous group (64.7%) as compared to induced group (40.0%) (Z=3.54; p<0.0001).

**2. Duration of labour in active stage and the patients of the two groups [Table-2]**

**Table-2: Duration of labour in active stage and the patients of the two groups**

Duration of labour In active stage (hours)	Spontaneous	Induced	TOTAL
<5	40	32	72
Row %	55.6	44.4	100.0
Col %	26.7	21.3	24.0
5 - 9	110	108	218
Row %	50.5	49.5	100.0
Col %	73.3	72.0	72.7
≥10	0	10	10
Row %	0.0	100.0	100.0
Col %	0.0	6.7	3.3
TOTAL	150	150	300
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0
Mean±s.d.	5.29±1.57	6.05±2.02	
Median	5	6	
Range	2 - 9	2 - 12	

$\chi^2=8.26$ ;  $p=0.016$  S-Significant Chi-square ( $\chi^2$ ) test showed that there was significant association between duration of labour and the patients of the two groups ( $p=0.016$ ). t-test showed that the mean duration of labour of the patients of the induced group was significantly higher than that of spontaneous group ( $t_{298}=3.49$ ;  $p<0.0001$ ).

**3. Time point of delivery in Partograph and the patients of the two groups [Table-3]**

**Table-3: Time point of delivery in Partograph and the patients of the two groups**

Time points of delivery in Partograph	Spontaneous	Induced	TOTAL
Before Alert Line	89	59	148
Row %	60.1	39.9	100.0
Col %	29.7	19.7	49.3

Time points of delivery in Partograph		Spontaneous	Induced	TOTAL
On The Alert Line	Row % Col %	2 100.0 0.7	0 0.0 0.0	2 100.0 0.7
Between Alert Line & Action Line	Row % Col %	51 34.5 17.0	76 51.5 25.3	127 100.0 42.3
Cross Action Line	Row % Col %	8 34.8 2.6	15 65.2 5.0	23 100.0 7.7
TOTAL	Row % Col %	150 52.6 100.0	150 47.4 100.0	300 100.0 100.0

$\chi^2 = 13.46$ ;  $p = 0.0037$  S-Significant Chi-square ( $\chi^2$ ) test showed that there was significant association between time point of delivery in Partograph and the patients of the two groups ( $p = 0.0037$ ). Between Alert & Action line was significantly higher in Induced group (51.5%) as compared to Spontaneous group (34.5%) ( $Z = 2.42$ ;  $p = 0.015$ ). Before Alert line was significantly higher in spontaneous group (60.1%) as compared to induced group (39.9%) ( $Z = 2.82$ ;  $p = 0.0046$ ).

#### 4. Maternal complication and the patients of the two groups

There was significant association between maternal complication and the patients of the two groups

( $p = 0.012$ ). In overall maternal complication was significantly higher in induced group (11.3%) as compared to spontaneous group (1.3%) it was significant ( $Z = 2.97$ ;  $p = 0.0028$ ).

#### 5. Fetal distress and the patients of the two groups [Table-4]

**Table-4: Fetal distress and the patients of the two groups**

Fetal distress		Spontaneous	Induced	TOTAL
Yes	Row % Col %	26 35.1 17.3	48 64.9 32.0	74 100.0 24.7
No	Row % Col %	124 54.9 82.7	102 45.1 68.0	226 100.0 75.3
TOTAL	Row % Col %	150 50.0 100.0	150 50.0 100.0	300 100.0 100.0

There was significant association between fetal distress and the patients of the two groups ( $p = 0.0032$ ). Fetal distress was significantly higher in induced group (32.1%) as compared to spontaneous group (17.3%) ( $Z = 2.46$ ;  $p = 0.013$ ).

#### 6. CTG abnormality and the patients of the two groups [Table-5]

**Table-5: CTG abnormality and the patients of the two groups**

CTG abnormality		Spontaneous	Induced	TOTAL
Normal	Row % Col %	104 57.1 69.3	79 43.4 52.7	183 100.0 61.0
Pathological	Row % Col %	29 38.2 19.3	47 61.8 31.3	76 100.0 25.3
Suspicious	Row % Col %	17 41.5 11.3	24 58.5 16.0	41 100.0 13.7
TOTAL	Row % Col %	150 50.0 100.0	150 50.0 100.0	300 100.0 100.0

$\chi^2 = 8.87$ ;  $p = 0.011$  S-Significant Chi-square ( $\chi^2$ ) test showed that there was significant association between CTG abnormality and the patients of the two groups ( $p = 0.011$ ). Pathological was significantly higher in Induced group (31.3%) as compared to Spontaneous group (19.3%) ( $Z = 1.98$ ;  $p = 0.04$ ).

#### 7. SNCU admission and the patients of the two groups:

There was significant association between SNCU admission and the patients of the two groups ( $p = 0.0011$ ). SNCU admission in induced group (28.7%) was significantly higher than Spontaneous group (13.3%) ( $Z = 2.77$ ;  $p = 0.0054$ ).

#### 8. Comparison of duration of labour (active stage in hrs)

There was significant difference in mean interval duration of labour (active stage in hrs) ( $F = 8.73$ ;  $p < 0.0001$ ). Mean duration of labour of Foley's was significantly highest for all and for amniotomy it was the lowest of all.

#### 9. Comparison of Different parameters of study in both group

There were no significant differences in mean age and gestational age of the patients of the two groups ( $p > 0.05$ ). Thus, the patients were matched for these parameters. There were no significant differences in baby weight and APGAR score at 1 minute of the two groups ( $p > 0.05$ ). The mean (Mean $\pm$ s.d) duration of interval between induction to delivery of the induced group was  $12.05 \pm 7.16$  hours.

## Discussion

In our study, mean total duration of labour in induced group is higher (6.05±2.02) hrs than spontaneous group is (5.29±1.57) hrs, which was found to be statistically significant (p value < 0.001). This shows that labour in induced and spontaneous is not comparable if partographically monitored. Our study finding is contrary to the similar study conducted by Ernest O. Orji et al<sup>3,11,12</sup> Anamika Singh & Smitha B. Rao et al,<sup>4</sup> Pramila Yadav et al<sup>5,13</sup> showed no significant difference in mean total duration of labour in both induced and spontaneous groups. Comparison of total duration of labour of different studies shown in [Table-6]. Mode of Delivery in our study, 48% (72 women) were delivered by caesarean section and 7% (11 women) by outlet forceps and 7% (5 women) by vacuum assisted and 40% (60 women) spontaneously in induced group. Whereas, 28% (42 women) were delivered by caesarean section and 3% (5 women) by outlet forceps and 4% (6 women) by vacuum assisted and 64.7% (97 women) spontaneously in spontaneous group.

**Table-6: Comparison Of Total Duration of Labour in Various Studies**

Mean Duration of Labour (hours)	Our Study	Ernest O. Orji et al <sup>67</sup>	Anamika Singh & Smitha B Rao et al <sup>62</sup>	Pramila Yadav et al <sup>95</sup>
Induced	6.05	6.507	6.507	5.43
Spontaneous	5.29	6.080	6.080	5.41
P value	P=0.016	0.131	0.15	0.865

Proportion of NVD was significantly higher in spontaneous group (64.7%) as compared to induced group (40.0%) (Z=3.54; p<0.0001). All the given studies, conducted by Ernest O. Orji et al<sup>3,11,12</sup> Anamika Singh et al, Smitha B Rao et al,<sup>4</sup> Pramila Yadav et al<sup>5,6,13</sup> show that rate of caesarean section is high in induced labour, which support my study.

Different studies mode of delivery comparison given in [Table-7].

**Table-7: Comparison of Caesarean Section Rate in Various Studies**

Caesarean Section	Our Study	Ernest O. Orji et al <sup>67</sup>	Anamika Singh & Smitha B Rao et al <sup>62</sup>	Pramila Yadav et al <sup>95</sup>
Induced	48%	35.3%	44%	25%
Spontaneous	28%	11.03%	21%	12%

Chi-square ( $\chi^2$ ) test showed that there was significant association between time point of delivery in Partograph and the patients of the two groups (p=0.0037). Number of deliveries occurred between Alert & Action line was significantly higher in Induced group (51.5%) as compared to Spontaneous group (34.5%) (Z=2.42; p=0.015) and deliveries occurred before Alert line was significantly higher in spontaneous group (60.1%) as compared to induced group (39.9%) (Z=2.82; p=0.0046). Comparison of deliveries in different groups show that most deliveries occur before the alert line in Anamika Singh & Smitha B Rao et al<sup>7</sup> which is contrary with our study. Number of deliveries occurred, which crossed the action line was more in induced group (18) 3.9% than spontaneous group (8) 2.1%. In our study these finding is similar with the study conducted by Pramila Yadav et al.<sup>5,7,13</sup> Different studies comparison given in [Table-8].

SNCU admission in induced group (28.7%) was significantly higher than Spontaneous group (13.3%) (Z=2.77; p=0.0054). Our study findings are contrary of the study conducted by Glantz JC *et al.*<sup>10</sup> Neonatal ICU admissions found no significant differences between the 2 groups. Study by Chaubey S et al<sup>9</sup> showed that only 2% new-born were shifted to NICU each among both groups. Study by Abisowo OY et

**Table-8: Comparison of time point of deliveries in partograph comparison with other studies**

	Our study induced cases (grp-B)	Spontaneous (Grp-A)	Anamika Singh & Smitha B Rao et al <sup>62</sup> Induced	Spontaneous	Pramila Yadav et al 95 Induced	Spontaneous
Women who delivered before alert line	59(39.9%)	89(60.1%)	78(57.4%)	75(55.1%)		
Women who delivered between alert and action line	76(51.5%)	51(34.5%)	13(11.3%)	38(33%)		
Women who delivered after action line	15(5.0%)	8(2.6%)	45(31.3%)	23(11.9%)	21(35%)	10(16.7%)
Women who delivered on alert line	0(0.0%)	2(0.7%)				

al<sup>8</sup> showed that 3.6% among spontaneous group were admitted to NICU and 7.3% of induced group.

## Conclusion

1. Partogram is efficient, time saving and gives a clear picture of labour. It facilitates anticipation with reasonable certainty of labour problems and indicates the need for clinical re-evaluation.
2. It also identifies the cases, which may require intensive intrapartum monitoring and possible intervention either operative or non-operative.

3. Induced labour monitored with simplified partogram is comparable to spontaneous labour with no increased adverse fetal outcome. Induced labour may raise the likelihood of a caesarean section, but it has no negative effects on the outcome of the new born. Therefore, induction of labour can be safe among primigravida if labour is partographically monitored.

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