

Outcome of Spontaneous Vaginal Delivery and Elective Induction of Labour in Postdated Pregnancy

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Summary:

Background: Postdated pregnancies are associated with increased perinatal morbidity and mortality. The risk increases when pregnancy continues beyond 41 wks. So, the Induction of labor conducted at or beyond 41 wks could help prevent these complications. But there are certain risks associated with Induction of labor. Again, Induction success varies widely and depends on some modifiable and non-modifiable factors.

Objective: To assess the fetomaternal outcome and analyze the factors affecting the outcome of electively induced labour in postdated pregnancy with a low bishop score compared to spontaneous onset labour in a secondary level hospital.

Materials and Methods: Prospective analytical study involving 220 participants divided into induction (study) and spontaneous labour (control) groups. Data collected on socio-demographic data, characteristics of the study population, causes of failed Induction, maternal complications and neonatal outcomes.

Introduction:

Continuation of pregnancy beyond the expected date of delivery (EDD) is called prolonged or postdated pregnancy. When it continues two weeks beyond EDD, it is termed as post-term pregnancy. The incidence of post-term pregnancies ranges between 4-14%; on average 10%¹. When pregnancy overruns the expected date, there is risk of placental insufficiency due to placental aging. As a result, there is a diminished placental function, oligohydramnios and meconium-stained liquor. These ultimately lead to fetal hypoxia, fetal distress, and fetal death. On the other hand, during labour postdated pregnancies has risk of labour dysfunction, cord compression due to oligohydramnios,

Results: Among electively induced postdated pregnancy (study group) vaginal delivery was 45.45% with caesarean section 54.54% compared to 80% and 20% respectively in the spontaneous labour (control group). Cervical dystocia was the commonest indication for caesarean section ($P=0.001$). Among maternal complications control group had significant perineal lacerations ($P=0.016$) and study group had a longer duration of hospital stay ($P<0.001$). The neonatal outcome didn't show significant difference.

Conclusion: The present study showed routine Induction of labor in prolonged pregnancy may encourage higher caesarean section rate with prolonged hospital stay but judicious Induction even in poor bishop score is not associated with any major fetomaternal complication. Further multicentric study with a larger sample size is recommended.

Keywords: Induced labour, Maternal complications, Neonatal outcome, Spontaneous labour.

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shoulder dystocia and increased incidence of birth trauma due to big size baby and non-moulding of fetal head due to hardening of skull bones. Following birth the baby has the chances of meconium aspiration, hypoxia and respiratory failure, hypoglycemia, polycythemia, increased neonatal intensive care unit (NICU) admission. All these complications are more with increasing number of days passed beyond the expected delivery date. The risk of still birth is increased by about three fold from 37 weeks to 43 weeks, 0.4/1000 vs. 1.5/1000 live birth, respectively. As perinatal morbidity and mortality are particularly increased in postdated pregnancy, continuing pregnancy needs intense fetal monitoring tools like cardiotocography (CTG),

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biophysical profile (BPP) etc. Still, these are not readily available in all secondary-level health care centers in Bangladesh. So Induction of labor (IOL) can be considered as the preferred method to achieve safe delivery rather than awaiting for spontaneous onset of labor beyond the expected date of delivery (EDD) ^{1,2}.

It is well established that labor needs to be induced in approximately 20 % of pregnancies³. Over the recent years, there has been an increase in the rate of medical and obstetrical indications, and the rate of elective inductions of labor. Elective Induction means the initiation of labor at term pregnancy without any acceptable medical or obstetric indication. Postdated pregnancy is the most common cause of IOL. The rate of IOL has doubled from 10 to 20% in the past decade, but the failure of induction is also observed in 20% of induced pregnancies^{4,5}. The success of IOL varies widely. It depends on modifiable and non-modifiable factors like maternal age, habits, obstetric history, gestational age and cervical status at the onset of Induction. Modified Bishop's scoring system is used for assessment of the cervical status prior to induction and include cervical dilatation, effacement, consistency, position and position of the presenting part^{5,6}. There is a consensus that the success of induced labour is directly related to the status of the cervix. Unfavorable cervix carries the risk of failed Induction with consequent higher caesarean section. There are several methods for Induction of labour (IOL) like medical, surgical and combined. There is very little to choose among the methods with a favorable pre-induction cervical score, but where the score is poor, prostaglandin has a distinct advantage over oxytocin. The effect of IOL on the duration of labor, fetomaternal outcomes and complications has been studied and found equivocal. Some studies show that uterine over activity and atony increases the risk of foetal distress and postpartum haemorrhage (PPH), respectively, increasing the rate of caesarean section^{7,8}. IOL was also found to increase the risk of instrumental vaginal delivery, blood transfusion, longer hospital stay, need for newborn care, and admission to neonatal intensive care unit (NICU)⁷. But one prospective study showed that in women with postdated pregnancy, Induction might not increase or even lower the risk of caesarean section and adverse fetal outcomes⁸.

This study was undertaken to assess and compare the success rate of IOL, factors affecting the success and the fetomaternal outcome in postdated pregnancies with low Bishop Score with those who started spontaneous onset of labor at term in a secondary level hospital.

Materials and Methods:

This prospective analytical study was carried out in the Department of Obstetrics and Gynaecology of the Sylhet CMH, Bangladesh from January, 2017 to December, 2019. Sylhet CMH was a secondary level hospital. As there was no Blood bank facility, blood donors were kept ready beforehand with proper cross matching in each case. Ethical clearance was obtained from the health research and ethical committee of Cmh, Sylhet. Informed written consent for IOL was obtained from each patient.

This study was conducted among 220 patients to compare the outcome between the women who had induction of labour (IOL) and those who had spontaneous labour. Among the 220 study population 110 patients were selected as case for IOL based on singleton pregnancy with gestational age >40wks (40+3 wk to 41+ wk) with cephalic presentation. And 110 women were selected as control based on who has undergone spontaneous onset of labour at term i.e. 37 wks or more. Patients presented with premature rupture of the membranes (PROM), obesity or any medical comorbidities were excluded from the study as they are likely to affect the outcome. In addition patients with previous uterine scar, intra uterine fetal death (IUFD), grand multipara, ante partum Hemorrhage (APH), elderly primi, mal-presentation, contracted pelvis, abnormal placentation, multiple pregnancy, foetal macrosomia and non-reassuring foetal status were also excluded from the study. Age, parity, BMI were matched between the case and control group.

Standard IOL protocol of hospital for the 'case' group was followed as below:

- Initially Bishop scoring was done for all. Who had Bishop Score >5, internal os open and fetal head reachable on pervaginal (P/V) examination, stripping of the membranes of cervix and lower uterine segment were done twice at 12 hour interval followed by oxytocin drip on next morning.
- Who had Bishop's score d" 4, cervix long tubular, Os closed and fetal head not reachable pervaginally,

tablet Misoprostol (PGE_1) 25mg 6 hourly used per vagina for two doses to make cervix favorable. Oxytocin drip was started after six hours of the last dose.

Oxytocin drip protocol: oxytocin titration technique was followed i.e. oxytocin was started with a low dose and was escalated at an interval of 20-30 minutes to get optimal response i.e. three uterine contraction in 10 minutes and sustained for about 40- 45 seconds. If optimal response is achieved, the drip is continued at the same rate.

Starting protocol of oxytocin administration:

- First bag: Oxytocin 5.0 IU for primigravida and 2.5 IU for multigravida in 500 ml of 5% dextrose in aqua at 10 drops/ minute and then titrated by increasing the rate of drops @ 5 drops / min at every 30 min interval upto 60 drops /min (equals to 40 mIU in primi and 20 mIU in multi).
- Then second bag of infusion started with 10 unit oxytocin in primi and 5 unit oxytocin in multigravida if needed , upto 60 mIU / min in primi and 40 mIU /min in multi.
- This Oxytocin Titration Technique used to complete within about 8 hrs in Primi and 5 to 6 hrs in multi.
- Amniotomy was done, when Bishop's score became favorable and os >4 cm. If liquor found clear, induction continued.
- Fetal heart rates (FHR) with uterine contractions were monitored intermittently on Cardiotocography (CTG) machine.
- World Health Organization (WHO) modified partograph was used to monitor the progress of labour.
- Caesarean delivery was performed if necessary, for failure to progress in labour or feto-maternal distress. After delivery, condition of the babies was assessed by measuring Apgar score at one minute and at five minute. Perinatal morbidity was measured in terms of admissions and observations in the NICU.
- Successful IOL was defined as achieving a vaginal delivery any time after the onset of induction of labour with partographic monitoring.
- Failure of induction was considered when patient didn't enter into active phase after completion of

induction procedure or urgent termination by LSCS needed due to feto-maternal distress.

In the control group no intervention was done except monitoring the progress of labour with maternal and foetal condition following the same protocol for the case i.e. induction group.

Data on the course of labour including delivery time (in control group), induction-delivery interval (in case group), indication of LSCS, feto-maternal outcomes with complications were noted in structured proforma.

Data obtained was analyzed using Minitab version 19. Descriptive and inferential statics were applied in the course of analysis (Anova). Proportions and percentages were calculated for categorical variables. Pearson's Chi-square test (a non-parametric inferential statistical procedure) were used to assess relationships and tactical significance between categorical variables. $P < 0.05$ was considered to be statistically significant at 95% confidence interval.

Result:

During the study period total number of deliveries was 929 and 307 of them were by elective LUCS. Among the rest, 116 (18.58%) underwent elective IOL.

In Table-I though maternal age, parity and BMI of case and control group shows no significant difference, but difference of mean gestational age at delivery is statistically significant ($p < 0.001$).

Table-II shows vaginal delivery occurred in 45.45% cases compared to 80% in control group ($p = 0.001$) with significant difference. In both the groups NVD was more in multi and LUCS was more in primi. Among the both groups only 9.09% of cases had misoprostol for cervical ripening and rest of all cases and control received stripping of cervical membrane. There was no statistically significant difference between overall mean induction-delivery interval and labour-delivery interval among the groups but multi had significantly less labour-delivery interval among control group than case group .

Among the indication of caesarean section cervical dystocia, CPD and fetal distress was significantly more in case group than the control group.

Notable maternal complications with statistical significance include perineal lacerations and more was in control group. The study group had significantly

Table-I

<i>Demographic data</i>			
Characteristics	Cases (N=110)	Controls (N=110)	P value
Maternal age in yrs: (mean ± SD)			
Primi (19-25 yrs)	22.05±1.919	22.125±1.810	0.837
Multi (23-35 yrs)	28.20±3.374	28.463±3.410	0.845
Parity:			
Primi	55	55	1.000
Multi	55	55	1.000
Gestational age in wks (mean±SD)	40.591±0.530	38.900±1.361	0.001
BMI in kg/m ⁻² (mean±SD)	27.038±2.869	27.517±1.979	0.151

P<0.05 was considered to be statistically significant at 95% confidence interval Pearson's Chi-square test (a non-parametric inferential statistical procedure).

Table-II

<i>Characteristics of the study population during induction of labour</i>			
Characteristics	Cases (N=110)	Controls (N=110)	P value
Pre induction Bishop Score:			
≤4	10	0	0.000
≥5	100	110	0.000
Methods of induction:			
Misoprostol	10	0	0.000
Stripping of membranes followed by oxytocin drip with /without ARM	100	0	0.000
Induction-delivery interval or labour-delivery interval (hrs)			
Primi	(7hr±2hr49min) (8hr7min±3hr12min)	(7hr10min±4hr21min)	0.171
Multi	(7hr32min±2hr22min)	(8hr31min±4hr27min) (5hr48min±3hr47min)	0.001
Mode of delivery:-NVD			
Primi	50(45.45%)	88(80%)	0.001
Multi	17(30.90%)	38(69.09%)	0.005
-LUCS	33(60.00%)	50(90.90%)	0.062
Primi	60(54.54%)	22(20%)	0.000
Multi	38(69.09%)	17(30.90%)	0.005
	22(40.00%)	5(9.09%)	0.001

P<0.05 was considered to be statistically significant at 95% confidence interval Pearson's Chi-square test (a non-parametric inferential statistical procedure).

Table III

<i>Factors affecting the outcome among the study population</i>			
Characteristics	Cases (N=60)	Controls (N=22)	P value
Indication for caesarean Section			
-Cervical dystocia	25	06	0.001
-CPD (diagnosed at active stage of labour)	06	02	0.008
-Meconium Stained liquor	10	05	0.763
-DTA	08	05	0.705
-Fetal Distress	08	0	0.000
-Maternal distress	03	03	1.000
-placental Abruption	00	01	0.317

P<0.05 was considered to be statistically significant at 95% confidence interval Pearson's Chi-square test (a non-parametric inferential statistical procedure).

Table-IV

<i>Maternal Outcome</i>			
Characteristics	Cases (N=110)	Controls (N=110)	P value
Primary PPH	4	4	1.0
Lacerations(Including Episiotomy)	41	66	0.016
Maternal distress	3	3	1.0
Duration of Hospital stay in days, (mean±SD)	2.89±2.68	1.86±1.97	<0.001

P<0.05 was considered to be statistically significant at 95% confidence interval Pearson's Chi-square test (a non-parametric inferential statistical procedure).

Table-V

<i>Neonatal outcome</i>			
Characteristics	Cases(N=110)	Controls(N=110)	P value
Birth wt. in gram, (mean±SD)	3205.5±356	3300.9±389	0.600
Apgar Score at 1 min.			
<7	16	10	0.239
>7	94	100	0.667
Apgar Score at 5 min.			
<7	2	5	0.257
>7	108	105	0.837
Observation in NICU			
Yes	13	6	0.108
No	97	104	0.621
Admission in NICU	4	3	0.705

P<0.05 was considered to be statistically significant at 95% confidence interval Pearson's Chi-square test (a non-parametric inferential statistical procedure).

Birth weight, Apgar score, NICU admission didn't show any significant difference between the groups.

longer duration of hospital stay compared to the control ($P < 0.001$). There was no maternal death recorded among the women studied.

Discussion:

The goal of induction is to achieve a successful vaginal delivery that is as natural as possible². Prolonged pregnancy is known to be associated with higher neonatal and maternal morbidity and mortality¹⁰. To decrease the risk of adverse outcome of prolonged pregnancy antenatal surveillance and IOL seems to be necessary⁹.

The rate of elective induction from this study was 18.58% excluding the case of elective caesarean section, which is similar to conducted by Abisowo OY et al. in a tertiary Hospital²⁰. Increase rate of elective induction observed in developed countries like 22.5% in the United States of America¹² and 21.8% in Canada¹³.

In this study successful vaginal delivery rate was 45.45% in induced cases compared to 80% in spontaneous labour, which is similar to the rate 44% and 79% respectively, reported by P. Sujata²⁵ and others^{12,14,22,23}. But our vaginal delivery rate is lower than the rate reported by Ekele BA and Oyetunji JA²³, by Orhue AAE et al.²² and Neelofur Babar Khan²⁴, which may be due to the use of prostaglandin like cervical ripening agent.

This study conducted with the case of low Bishop Score. It is well known that success of IOL depends on favorability of cervix. In spite of unfavorable cervix this study outcome was better than some previous studies even without using prostaglandins for cervical ripening. The percentage of caesarean section was 54.54% in our study and 63% in the similar study by Jahan S.²⁶ in cases of unfavorable cervix without prostaglandin use. But in another study by Sultana R.²⁷, this percentage was 45.45% in unfavorable cervix after using prostaglandin. Again Orji EO and Olabode TA (2008) achieved successful induction of labour in 64.7% of nulliparous women following use of vaginal misoprostol compared to 72.1% who had spontaneous labour⁷.

Our study rate of caesarean section (54.54%) compared to spontaneous onset labour (22%) is consistent with other studies^{15,16,17}. But Otaide FE and Okonofua V³³ and Rand L et al.²⁸ suggest that the risk of caesarean delivery after induction is lower than that reported earlier, possibly because of improvements in methods for cervical ripening²⁷. So the policy of routine induction at

around 41-42 weeks may be advocated in developing countries, in view of the uncertainty of further prolongation of pregnancy beyond 42 completed weeks.

Vaginal delivery rate was more in multigravida in both induced and spontaneous onset labour groups (60% and 90.90% respectively) compared to primigravida (30.90% and 69.09% respectively). Inversely, Caesarean section rate in this study was observed to be higher in primi compared to multiparous women in both groups, which was similar to findings of Orji EO and Olabode TA⁷ and Sujata P et al.²⁵ and Sultana R et al.²⁷

There were no significant difference in the mean age, parity and birth weight in the present study like the findings of Sujata P et al.²⁵ except gestational age (in weeks) ($P = .001$).

Failed induction in this study was mostly due to cervical dystocia (25 vs 5), fetal distress with meconium stained liquor (18 vs 7), failure to progress of labour due to cephalopelvic disproportion and deep transverse arrest (14 vs 6) and maternal distress (3 vs 3) in the study and control groups respectively. This finding was similar to other studies^{7,18,19}. However, Ezechi C et al. (2004) listed cephalo-pelvic disproportion, fetal distress, prolonged labour and antepartum haemorrhage as causes of their failed induction²¹. But the study by Sultana R et al. (2014)²⁷ showed that 55% caesarean section was due to foetal distress and 45% were due to failure to progress, which is contradictory to our study.

The mean induction-delivery interval (7hr±2hr49min) showed no significant difference compared to latent phase of spontaneous labour to delivery interval (7hr10min ± 4hr 21min). This was comparable to a mean duration of (6.08 vs 6.50 h) reported by Orji EO and Olabode TA (2008) in similar groups⁷, which indicates that induced labour is not necessarily associated with prolonged labour in the presence of adequate monitoring.

No statistical significance observed in the rates of postpartum hemorrhage between the two groups. But perineal lacerations occurred more in spontaneous labor than in induced group (66 vs. 41), which findings were similar to other studies^{7,23,32} and in contrast to the study by Gláucia Virgínia Guerra et al.³¹.

Difference in duration of hospital stay between the two groups was significant ($p < 0.001$) like the findings of

Sujata P et al.²⁵. Two factors may have contributed to this. First, women planned for induction were admitted to the hospital 1 to 2 days before the procedure. Second, the higher caesarean delivery rate in the induction group was associated with a longer post-delivery length of stay. This was similar to finding in other studies^{21,29}.

The neonatal Apgar scores at 1 and 5 min of both groups showed no statistically significant difference. However, a higher proportion of the babies delivered following IOL had better Apgar scores at 5 min compared to spontaneous labour group. This finding was in agreement with that reported by Orji EO and Olabode TA (2008)⁷. The eventual neonatal outcome showed that there was no significant birth asphyxia or neonatal death in study groups. Selo-ojeme D et al.¹⁹ noted that the rate of adverse neonatal outcome (poor Apgar score and low arterial cord pH) was higher in their induction group and may be related in part to uterine hyper stimulation which could be minimize by proper titration of dose of inducing drugs.

This study is not without its limitations. Here, small size of sample is studied. Accurate determination of the actual concentration of oxytocin delivered to each patient was not possible because of the non-availability of infusion pumps and this may have influenced the successful induction rate observed in this study. Lack of use of comparatively costly prostaglandin like strong cervical ripening agent increases induction failure rate due to cervical dystocia. Study population couldn't be observed for more duration considering the limited management facility of fetomaternal risk in our secondary level hospital.

In spite of some limitations successful induction rate, labour-delivery interval and perinatal outcomes in this study were comparable to those documented in other studies and also the overall rates of complications remained low. Although induction of labour is a safe procedure, but the indication of induction and the resources available at the institution for care of the woman and her newborn must be taken into consideration when induction of labour is indicated.

Conclusion:

The aim of this prospective study was to evaluate the obstetric and perinatal outcome of routine IOL in prolonged pregnancy in the context of developing country like Bangladesh where inadequate antenatal

fetal surveillance facilities and poor patient compliance for routine checkup may jeopardize the fetomaternal outcome. The outcome was satisfactory even with low Bishop Score without any major fetomaternal complications. Considering this fact IOL can appear fruitful for postdated pregnancy and an excellent outcome can be achieved by using prostaglandin like cervical ripening agent. But proper intrapartum fetomaternal monitoring facilities with access to emergency management care like caesarean section, PPH management, NICU support etc. should be readily available.

We recommended further multicentric prospective comparative studies of large sample size to have a better understanding of the factors affecting the outcome of induction of labour.

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Conflicts of interest

This work has no potential conflicts of interest, whether of financial or other nature.

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