



## FETAL OUTCOME FOLLOWING INDUCTION OF LABOUR AT A SPECIALIST HOSPITAL, KADUNA, NIGERIA

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### ABSTRACT

One hundred and fifteen cases of induced labour between January 2006 and December 2009 were studied at the Garkuwa Specialist hospital, Kaduna, Kaduna State, Nigeria. The age of the patients ranged from 16 to 43 years with mean age of 26. 26 (+4.08) years. There were 61(51.5%) primiparae and 54(48.5%) multiparae in the series. Hypertensive disorders accounted for 37.39% of all indications for induction; followed by prolonged pregnancy (20%) and premature rupture of the membranes (16.52%). The most popular method of induction was by cervical ripening with intracervical Prostin-E2 insertion prior to synchronous fore water amniotomy and intravenous oxytocin infusion accounting for 84.3% of cases. Eighty-five (73.9%) of the patients delivered vaginally while 30 (26.08%) ended in an emergency caesarean section. Forty-five (83.3%) of multiparae had vaginal delivery and 9 (16.7%) had caesarean section while 40 (65.7%) of primiparae were successfully induced and 24 of them (34.3%) had caesarean section. In 36 patients with lower Bishop scores (i.e.<6), vaginal deliveries occurred in 20 (44.5%) while 16 (44.44%) had caesarean section. Contrarily, out of 79 cases with higher Bishop scores (i.e. > 6), 67 (84.8%) had vaginal deliveries and 15.2% had caesarean section. The mean induction delivery interval (IDI) for lower (i.e. 4-6), intermediate (7-9) and higher Bishop scores (10-12) were 10.2 + 3.13 hours, 8.65 + 0.69 hours and 3.93 + 1.17 hours, respectively. The commonest indication for caesarean section was foetal distress (33%) followed by inefficient uterine action and cervical dystocia (20%). With the exclusion of intrauterine foetal death as an indication, there was no recorded case of perinatal or maternal mortality in the series.

### INTRODUCTION

Induction of labour is the artificial initiation of uterine contractions after the gestational age of viability prior to their spontaneous onset leading to progressive dilatation and effacement of the cervix, with the ultimate aim of achieving a vaginal delivery and favourable outcome for mother and baby where feasible [1]. The incidence or induction rate is quite varied in centres around the world. In Nigeria, figures quoted range between 3 and 20 %. Meanwhile, rates between 10 and 25 % are common in industrialized countries like UK [2]. The general trend is

that induction rates are often lower in developing countries where manpower and technology for confident assessment and monitoring of foetal well-being are poorly developed. In addition, individual differences in unit protocols will also account for the wide range even in the same centre [2]. The decision to induce a pregnancy should be taken when the risks associated with the process is outweighed by that of allowing the pregnancy to continue [3]. These risks can be to the mother and/or baby. Indications for induction of labour will therefore include prolonged pregnancy,



intrauterine growth restriction, and diabetes mellitus, among others. However, induction of labour is sometimes performed for the convenience of the mother and / or obstetrician in the absence of any definite medical or obstetric indication or clear health benefit. This is often described as social indication for induction. Whatever the indication, it must be emphasized that the alternative to a failed induction is a caesarean section and hence indications must not be trivialized.

Induction of labour is contra-indicated in conditions like gross cephalopelvic disproportion, persistently abnormal lie, undiagnosed ante-partum haemorrhage, two or more previous lower segment caesarean sections or one previous classical caesarean section, previous successful vesico-vaginal fistula repair, among others. In fact, almost any contraindication to vaginal delivery will be a contra-indication to induction of labour. Furthermore, patients who are unable to give an informed consent should not be induced. The latter group include women who advocate “natural labour” and hence develop a feeling of dissatisfaction and unfulfillment following successful inductions.

Methods of induction have significantly improved over the years especially with the better understanding of the physiology of parturition and the report by workers like Turnbull and Anderson [4] on the efficacy of synchronous use of oxytocin titration and forewater amniotomy. The present day use of cervical ripening agents have underscored the importance of the cervical status in achieving a successful induction as enunciated by Bishop et al in 1964 [5]. Such agents include prostaglandin preparation [6], intracervical Foley catheter insertion [7], relaxin gel [8], hygroscopic dilators and even breast stimulation, misoprostol, just to mention a few.

Complications of induction of labour include iatrogenic foetal distress from hyperstimulation, precipitate labour, uterine rupture, cord accidents, amniotic fluid embolism, postpartum haemorrhage and maternal depression.

For the purpose of this study, a successful induction is taken as one ending in a vaginal delivery and a failed induction as one ending in an emergency caesarean section [11].

This study hopes to review the process of induction of labour in our centre and compare the outcome with results from other centres.

## AIM AND OBJECTIVES

The aim of the study is to review and critically reappraise the process of induction of labour at the Obstetric unit of Garkuwa Specialist hospital, Kaduna, Kaduna State, Nigeria. Among the objectives are to determine the indications for induction of labour, methods of induction of labour and the fetal outcome.

## MATERIAL AND METHOD

This was a retrospective study of 115 consecutive singleton pregnancies that had induction of labour over a four year period from January 2006 and December 2009 at the Obstetric unit OF Garkuwa Specialist hospital, Kaduna, Kaduna State, Nigeria. The total number of singleton deliveries during the period under review was 940, but only those had induction for whatever reason were included in the study. The pregnant women who had spontaneous labour were excluded. Data were obtained from patient's case notes and labour ward records. Data analysed were those relating to socio-demographic characteristics of the patients, age, parity, relevant past and present history, gestational age at induction, indication for and methods of induction, induction-delivery interval (i.e. interval between time of amniotomy and time of delivery), cervical status at onset of amniotomy using Bishop Score (post-cervical ripening if done) and maternal and fetal outcome. Data were summarised and presented as tables and charts and Statistical analysis of association between the independent variables and the fetal outcome was carried out with chi-square ( $\chi^2$ ) and statistical significant set at  $P=0.05$ .

## RESULTS

The total number of singleton deliveries during the period under review was 940. Of the total 940 the proportion of women who had induction of labour was 115(12.2%). Majority of the pregnancies induced were between 37 to 42 weeks (51.3%); followed by 28-36 weeks (27.83%) and the least were pregnancies above 42 weeks (20.87%). The highest frequency of induction was in the age group 25-29 (30.43%) while the least was amongst women at the extremes of age (Table 1). The age range and parity are comparable but more women of 25 years and above (70.42%) had induction of labour. Parity was grouped as per outcome of induction as summarized in Table III. The result t shows a statistically significant association between parity and outcome; with multiparae having significantly higher success rates (i.e.  $P < 0.01$ ).

The indications for induction of labour are summarized in Table II. Hypertensive disorders (mild and severe) and prolonged pregnancy (pregnancy beyond 42 weeks) were the commonest obstetric indication (37.39% and 20.87 respectively); followed by premature rupture of membranes (16.52%) and antepartum haemorrhage (9.57%). There were 3 cases of chronic polyhydramnios (2.60%) with one having multiple fetal congenital abnormalities. Diabetes in pregnancy and maternal cardiac diseases accounted for 5.22% and 0.87% respectively.

Table III shows the different methods of induction applied. Ninety eight (85.2%) of patients required cervical ripening with intracervical Prostin-E2 insertion and 1(0.87%) required intracervical Foley's catheter insertion prior to amniotomy. Eighteen (15.7%) cases did not require cervical ripening. Only ten (8.7%) cases did not require



intravenous oxytocin infusion, as they were successfully delivered following cervical ripening alone with Prostin-E2. The relationship between Bishop Score and outcome is as shown in Table IV. There is a significant association between Bishop Score and favourable outcome ( $p < 0.01$ ). All cases with Bishop Score above 9 had a favourable outcome except one. comparison between mean values of induction delivery interval (IDI) in hours to the Bishop score in the 85 successful cases. There is an obvious tendency of reduction in mean IDI as Bishop score increases, lower Bishop score (4-6) have mean IDI of 10.2+ 3.13 hours, intermediate B/S (7-9) have mean IDI of 8.65 2.21 0.69 hours and higher B/S (10-12) have 3.93+ 1.17 hours. Overall mean IDI is 8.22 + 2.57 hours.

Of the 78 (91.8%) women with favourable or moderately favourable cervix (Bishop Score  $> 5$ ), only 4.1 % delivered after 12 hours, whereas 36.4% of the 37 women with unfavourable cervix (Bishop Score  $< 4$ ) delivered after 12 hours. Four women (3.4%) had precipitate labour (IDI  $< 4$  hours). Three of the primigravidae had prolonged labour (IDI  $> 16$  hours) while none of the multiparae had prolonged labour. It was also observed that 86.7% of those with Bishop Score  $> 5$  had successful induction, while 50% of those with Bishop Score 0 – 4 had failed induction for which caesarean section was performed. The success of induced labour is 73.9%. Out of the 61 primigravidae induced, 40 (65.6%) was successful whereas out of the 54 multiparae induced,

45 (83.3%) was successful. Clearly, multiparity was associated with a likelihood of a successful induction of labour.

The indications for caesarean section for failed induction are shown in Table VII.

Foetal distress was the commonest indication for emergency caesarean section while 8 of them (26.67%) had caesarean section because of failure to establish regular uterine contraction in spite of infusion of increasing concentration of oxytocin. This led to failure to progress in labour. This was followed by cephalopelvic disproportion and cervical dystocia that were each responsible for caesarean section in 20.0% of those delivered this way. All the 6 women that had caesarean section due to cephalopelvic disproportion where primigravidae.

Out of 85 vaginal deliveries, 79 were spontaneous and 6 had forceps delivery. Indications for instrumental deliveries were poor maternal effort leading to delayed second stage of labour (4 cases) and persistent malposition (1 case). Three (3.53%) babies suffered severe birth asphyxia (first minute Apgar 4 – 6). All were successfully resuscitated.

Maternal complications associated with successful inductions were hyperstimulation (9.41%), puerperal pyrexia (5.88 %), genital laceration (4.70%), postpartum haemorrhage (11.76%) and precipitate labour (3.53%). It is of interest to note that 64.70% of the patients had no complications.

**Table 1. Age and gestational age distribution of women induced (n=115)**

Age (Years)	Frequency	Percent
15 – 19	14	12.17
20 – 24	20	17.39
25 – 29	35	30.43
30 – 34	26	22.61
35 – 39	15	13.04
40 – 44	5	4.34
Gestational Age		
28 – 36	32	27.83
37 – 42	59	51.30
> 42	24	20.87

Mean age-26.26 + 4.08

**Table 2. Indications for induction of labour (n=115)**

Indication	Frequency	Percentage %
Hypertensive Disorders (Mild & Severe)	43	37.39
Prolonged Pregnancy (>42 Weeks)	24	20.87
Premature Rupture of Membranes	19	16.52
Antepartum Haemorrhage	11	9.57
Diabetes in Pregnancy	6	5.22
IUFD	5	4.34
Elective Induction at Term polyhydramnios	3	2.60
Maternal Cardiac Disease	3	2.60
	1	0.87



**Table 3. Methods of induction**

Methods	Frequency	Percent
Cervical ripening with intracervical Prostin-E2 insertion	17	14.8
cervical ripening with intracervical Foley's catheter	1	0.87
Intravenous oxytocin infusion		
<b>Yes</b>	<b>105</b>	<b>91.3</b>
<b>No</b>	<b>10</b>	<b>8.7</b>

**Table 4. Predictors of outcome of induction of labour (n=115)**

Parity/ Outcome	Successful Induction (%)	Failed Induction (%)	Total (%)	P value
Primiparae	40 (65.6)	21 (34.4)	61(100.0)	0.000
Multiparae	45 (83.3)	9 (16.7)	54 (100.0)	
Total	85 (73.9)	30(26.1)	115(100.0)	
Bishops score				0.000
< 6	20 (55.5)	16 (44.4)	36(100.0)	
> 6	67 (84.5)	12 (15.2)	79(100.0)	

Mean Parity: 0.88 + 4.23 (P < 0.01)

**Table 5. Induction – Delivery interval as per bishop score in eighty five successful inductions (n=85)**

Bishop Score	Frequency	Mean IDI (Hours)
4	3	21.47
5	4	9.81
6	13	9.23
7	15	7.73
8	24	9.25
9	11	8.58
10	8	4.51
11	3	5.38
12	4	2.28

B/S 4-6; Mean value of IDI of 10.20 + 3.13 hours, B/S 7-9; Mean value of IDI of 8.65 + 0.65 hours, B/S 10-12; Mean value of IDI of 3.93 + 1.17 hours, Overall mean IDI is 8.22 + 2.57.

**Table 6. Causes of failed induction (n=30)**

Indications	Frequency	Percentage
Fetal Distress	10	33.33
Inefficient Uterine Action	8	26.67
Cephalopelvic Disproportion	6	20
Cervical Dystocia	6	20

## DISCUSSION

The advent of a better understanding of the physiological processes of pre-labour and labour events as well as better methods of ante-partum and intrapartum feto-maternal monitoring have amongst other things largely improved the safety and outcome of induced of labour. This study has shown that the induction rate is 12.2 % which compares favourably with figures reported from Lagos<sup>5</sup> and Benin<sup>7</sup>. Despite the fact that most of the patients have biased attitude for induction as a result of several misplaced ideas and wrong information about it as was shown by a study in this country [9].

The overall successful induction rate of 73.9% is comparable with high success rate of 87.3% and 90.4% reported from Lagos [5] and Benin [6] respectively. This study and other reports from Nigeria therefore continued to

show greater successful induction rate in Blacks than has been reported by other workers in Europe [10,11]. This high success rate may be due to strict selection criteria, which excludes those women with suspected cephalopelvic disproportion and the use of Prostin-E2 vaginal tablets for cervical ripening and pharmacological dose of oxytocin drip, using high concentration when indicated.

Though six of the patients had caesarean section inspite of steps taken to exclude them from the study by performing clinical pelvimetry at 36 weeks gestation. However, it is associated with low predictive value and magnetic resonance imaging (MRI) is preferred for pelvimetry.

It was also observed that no case of pregnancy with breech presentation was induced throughout the study



period. This may be due to the fact that such cases are usually delivered by caesarean section whenever there is any added obstetric or medical complication that may warrant induction.

The caesarean section rate of 26.10% in this study is high compared to that reported by Orhue (9.6%) [7] and that reported from Lagos (12.7%) [5]. This may be due to the fact that the patients induced were mostly having high risk pregnancy. Foetal distress and cephalopelvic disproportion accounted for up to 53.33% of the caesarean section in this study.

The indications for induction revealed that hypertensive disorders, premature rupture of membrane (PROM) and prolonged pregnancy accounted for the highest number of women induced. The finding that about 31% of the women needed intervention during delivery (forceps and caesarean section) was not surprising. This is because most of the women undergoing induction of labour were of high-risk pregnancy and as a policy, second stage of labour was always shortened either by forceps delivery or vacuum extraction in patients with hypertensive disorders. However, this finding is in agreement with other reports [12,13]. Also the finding that parity and pre-induction Bishop score significantly influenced the outcome of labour in this study support findings from previous reports from other centres [3,5,7].

Routine planned delivery by induction of labour (elective induction) of patients who have reached their calculated expected date of delivery (EDD) accounted for 2.60% of cases in this study. In some centres it accounts for a higher percentage [5]. Advocates of this policy argue that such planned deliveries occur during the day when personnel and logistic support are optimal. In addition the deliveries are conducted under the supervision of the antenatal care managing team and so the patients are less anxious on seeing familiar faces. Also such patients on induction tend to be generally better and more closely monitored in labour than non-induced ones. Finally, planned deliveries offer an opportunity for both obstetrician and patient to organize their schedule around a known date of delivery. Antagonists however will insist that the decision to induce should solely depend on convincing evidence that terminating the pregnancy will be of clinical benefit to mother and/ or baby. An obvious disadvantage of routine planned delivery at EDD is a higher likelihood of preterm deliveries except of course there exists accurate means of ascertaining the true gestational age such as first trimester ultrasound dating. This is not commonly done in our environment where most women book in the latter half of pregnancy.

This study also highlighted the higher failure rate of induction amongst primiparae as compared to multiparae. This observation was made in a previous study from another hospital [12]. It may be because of the relative resilience of an untested cervix of a primipara when compared to a multipara. The practicability of a pelvic clinical inducibility scoring system was pioneered

by Bishop et al [5]. Since then it has remained extremely useful in assessing the state of the cervix prior to induction. This study, like other ones [3,8,5,12] have shown significant differences in the higher failure rates, longer induction-delivery interval (IDI) and larger doses of oxytocin associated with lower Bishop scores when compared to higher ones.

Historically, methods of induction have evolved over the years [17-19]. The preferred method of cervical ripening at this hospital is by intracervical insertion of Prostin-E2. The method of cervical ripening with Foley catheter insertion prior to synchronous forewater amniotomy and intravenous oxytocin infusion [18-20] was not popular in our centre, relatively safe, easily available and cheap. Its major drawback is that is associated with a higher infectious morbidity [8,20]. Other methods of cervical ripening include the use of Laminaria tents, Dilapan osmotic dilators and sweeping of the membranes [14]. This study showed a cervical ripening rate of 85% in all cases of induction.

The failed induction rate of about 32% in this study is higher than a caesarean section rate of 12% for the whole hospital deliveries [15]. In this series, the most common indication for emergency caesarean section following failed induction was cephalopelvic disproportion with 31%. This underscores the importance of antepartum foetal weight estimation and maternal clinical pelvimetry before embarking on induction of labour. Of significance was that out of six cases in which high presenting parts were recorded (i.e. station of presenting part O-3), five ended in caesarean section for cephalopelvic disproportion.

The relatively low rate of fetal morbidity further underscores the observation that induced patients tend to be better supervised and more closely monitored in labour than non-induced ones. This is exemplified by the fact that 64.70% of the mothers had no complication. The main maternal complication of postpartum haemorrhage recorded in about 12% of the patients can be traced to prolonged induction-delivery interval and the fact that uteri exposed to high oxytocin level intrapartum usually requires a higher oxytocin level to contract postpartum [20].

## CONCLUSION

This study has shown that the induction rate was 7.2% and that the commonest indication for induction of labour was hypertensive disorders and cervical ripening with intracervical Prostin-E2 insertion prior to synchronous oxytocin infusion is the commonest method of induction of labour. The commonest fetal indication for induction of labour was premature rupture of membranes and prolonged pregnancy, and commonest indication for caesarean section following failed induction is fetal distress underscoring the importance of improved intrapartum fetal monitoring. The fetal outcome is very good and this is attributable to the fact that fetuses in induced labour are usually more closely monitored, thus ensuring better outcomes.



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