

## Evaluation of Delivery Outcomes in Pregnant Women Following Induction of Labor by Administration of Misoprostol

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### Abstract

**Background:** Labor is defined as the progressive dilation of uterine cervix in association with repetitive uterine contractions. Induction of labor may be described as the process of stimulating the uterus to start labor. It refers to iatrogenic stimulation of uterine contractions to achieve delivery prior to onset of spontaneous labor or on failure of natural labor. It is generally planned when the risks of continuing the pregnancy are considered greater than the risks associated with planned birth. **Objectives:** The current study was conducted to evaluate the risk of cesarean section in 50 pregnant women on induction of labor. **Methodology:** The study included 50 women with singleton live pregnancies between 37 – 41 weeks with cephalic fetal position. Women with the history of multiple pregnancies, malformations in the uterine cavity, previous cesarean section, placenta previa were excluded from the study. Induction was started early morning by administration of tab misoprostol 50 mcg every 6 hours for a maximum of four doses in 24 hours. The progress of labor was evaluated by assessing uterine contractions every 30 minutes, monitoring the fetal heart rate by the CTG device. Cesarean delivery was performed in cases of fetal distress or failure to progress in labor. The readings were recorded in master chart, and the data analysis was carried out statistically. **Results:** 50 pregnant women with singleton live pregnancies between 37 – 41 weeks with cephalic fetal position were included in the study. All patients were between 22-40 years of age group. Gestational ages of fetus were between 37.1 to 41 weeks. 17 out of 50 underwent cesarean delivery, whereas 33 underwent vaginal delivery. Out of these 17 women, 2 had gestational hypertension, 2 present with premature rupture of membrane, 1 had post dated pregnancy, 7 had a non reassuring fetal heart rate, 4 had symptoms of preeclampsia and 1 had gestational diabetes. Out of 33 women with vaginal delivery, 3 had gestational hypertension, 8 present with premature rupture of membrane, 16 had post dated pregnancy, 1 had a non reassuring fetal heart rate, 3 had gestational diabetes and 2 had chronic hypertension. **Conclusion:** Our study clearly indicates that induction of labor doesn't necessarily increase the chances of cesarean section as most of the subjects in our study underwent vaginal delivery. Our results imply that induced labor at full term is acceptable, even if it is only for the convenience of the obstetrician or the pregnant woman.

**Keywords:** Cesarean Section, Fetal Heart Rate, Labor Induction, Uterine Contractions Vaginal Delivery.

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### Introduction

A pregnant woman is considered 'at term' once her gestation period reaches 37 weeks. Labor is defined as the progressive dilation of uterine cervix in association with repetitive uterine contractions[1]. In the older times, techniques like mammary/ nipple stimulation and mechanical dilation of the cervical canal were considered as the safe and preferred methods of labor induction. Induction of labor may be described as the process of stimulating the uterus to start labor[2] It refers to iatrogenic stimulation of uterine contractions to achieve delivery prior to onset of spontaneous labor or on failure of natural labor[3] Induction of labor may be ensued in case of postdated gestation period, maternal complications like preeclampsia, premature rupture of membranes, chorioamnionitis, gestational diabetes or hypertension, chronic hypertension or during fetal distress.<sup>4</sup> Labor

induction has been on ascend over recent decades with marked variation amongst countries and hospitals. It is generally planned when the risks of continuing the pregnancy are considered greater than the risks associated with planned birth.<sup>5</sup> Women with postdated pregnancy and preeclampsia are induced to reduce the risk of still birth; women with premature rupture of membranes are induced to reduce the risk of maternal sepsis and neonatal infection; women with diabetes are induced to reduce complications like still birth, macrosomia, respiratory distress, birth defects[5]

There are several methods available for induction of labor and are selected based on various factors including preference of patient and the doctor and status of the cervix and membrane. These are membrane sweeping, pharmacological agents like PGE<sub>2</sub>, oxytocin, surgical methods like amniotomy, mechanical methods like insertion of balloon catheters and laminaria tents[6]. Induction of labor ripens the cervix and initiates uterine contractions in women who are not in labor, causing progressive dilation of the cervix to accomplish vaginal birth. It has been reported in numerous studies that labor induction is associated with an increased risk of cesarean section. However, it has also been observed that the increased risk of cesarean is seen at a gestation period of 37 to 39 weeks, whereas the chances of cesarean section reduce after 40 weeks of gestation[7].

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Timing of delivery is an essential constituent of a healthy pregnancy. Preterm birth is one of the leading cause of neonatal morbidity and mortality globally whereas, postdated/ post term pregnancies are also allied to increased maternal neonatal risks. Therefore, it is stated that the obstetrician could consider labor induction between 41<sup>0</sup> to 41<sup>7</sup> weeks of gestation period and induction of labor is suggested after 42<sup>0</sup> weeks of gestation period[7,8].The current study was conducted to evaluate the risk of cesarean section in 50 pregnant women on induction of labor.

#### Materials and Methods

The study included 50 women with singleton live pregnancies between 37 – 41 weeks with cephalic fetal position. The study was carried out at Dept. of Obstetrics and Gynaecology in the Hospital. Ethical permission was granted from the Ethical Committee Board and an informed consent was taken for all the patients. Women with the history of following conditions were excluded from the study:

- Multiple pregnancies
- Malformations in the uterine cavity
- Previous cesarean section
- Placenta previa
- Active genital herpes infection
- Meconium in liquor

Induction was started early morning by administration of tab misoprostol 50 mcg every 6 hours for a maximum of four doses in 24 hours. The progress of labor was evaluated by assessing uterine contractions every 30 minutes, monitoring the fetal heart rate by the CTG device. Cesarean delivery was performed in cases of fetal distress or failure to progress in labor. The readings were recorded in master chart, and the data analysis was carried out statistically.

#### Results

50 pregnant women with singleton live pregnancies between 37 – 41 weeks with cephalic fetal position were included in the study. All patients were between 22-40 years of age group. The mean, median and standard deviation were 30.76yrs, 29.5yrs and 4.69 respectively (Table 1).

Gestational ages of fetus were between 37.1 to 41 weeks. The mean, median and standard deviation were 39.13weeks, 39.14weeks and 1.12 respectively (Table 2). The duration of labor lasted between 3 to 20 hours. The mean, median and standard deviation were 8.24 hrs, 8 hrs and 3.80 respectively (Table 3).17 out of 50 underwent cesarean delivery, whereas 33 underwent vaginal delivery. Out of these 17 women, 02 had gestational hypertension, 02 present with premature rupture of membrane, 01 had post dated pregnancy, 07 had a non reassuring fetal heart rate, 04 had symptoms of preeclampsia and 01 had gestational diabetes (Table 4). Out of 33 women with vaginal delivery, 03 had gestational hypertension, 08 present with premature rupture of membrane, 16 had post dated pregnancy, 01 had a non reassuring fetal heart rate, 03 had gestational diabetes and 02 had chronic hypertension. None of the women reported with preeclampsia (Table 4).

#### Discussion

Induction of labor is the most frequent procedure in obstetric medicine; purportedly applied in 20% to 25% of all pregnancies. It is widely adapted to prevent complications or outcome such as caesarean delivery, prolonged labor, postpartum hemorrhage and traumatic birth and also to improve health outcomes for women and neonates. The indications for induction of labor in our study were postdated pregnancy, gestational hypertension, premature rupture of membrane, non reassuring fetal heart rate, preeclampsia, gestational diabetes, chronic hypertension. Elective induction was carried out with administration of Tab misoprostol 50 mcg every 6 hours for a maximum of four doses in 24 hours.The progress of labor was evaluated by assessing uterine contractions every 30 minutes, monitoring the fetal heart rate by the CTG device. Cesarean delivery was performed in cases of fetal distress or failure to progress in labor.

All the women presented with 37 – 41 weeks of gestation period (term pregnancy) with cephalic fetal position. The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) have defined full-term pregnancy as the one that lasts between 39 weeks to 40 weeks 6 days. Term babies have the preeminent likelihood of being healthy in comparison to the babies born earlier or later[9].The duration of labor lasted between 3 to 20 hours. There was a wide range of time gap between induction of labor and delivery amongst all pregnant women. According to a study conducted by *Blackwell et al 2008* to evaluate the relationship between duration of labor induction and successful vaginal delivery in nulliparous women at term, it was concluded that there was no association with prolonged induction to delivery intervals and adverse outcomes[10]

17 out of 50 (34%) underwent cesarean delivery, whereas 33 (66%) underwent vaginal delivery. Our study clearly indicates that the risk of cesarean delivery associated with induction of labor is less. Our results were in concordance with a study conducted by *Heffner LJ and colleagues 2003* who avowed that labor induction was associated with an increase in cesarean delivery from 13.7% to 24.7%. Other factors that positioned a nulliparous woman at an augmented risk for cesarean delivery were maternal age of above 35 years and gestational period over 40 weeks. <sup>11</sup> However in our study, majority of the postdated pregnancies (>40 weeks) presented with vaginal delivery (48.4%).Our results were contrary to the study by *Maslow et al 2000* who found that elective induction placed nulliparous at a higher risk for cesarean delivery by two fold. They also highlighted that an increasing maternal age is associated with an increased risk of cesarean delivery[12]Majority of the cases with vaginal delivery as mentioned above had postdated gestation period (16/33; 48.48%). Only 1 case with postdated pregnancy was delivered via cesarean section. Similar results were found in a study conducted by *Kim et al 2018* who conducted a study to compare the benefits and risks of labor induction versus spontaneous labor in uncomplicated nulliparous women at >39 weeks of gestation. It was observed that out of 237 women, 199 delivered vaginally (84.0%). There are benefits associated with induction of labor at full term like reduced chances of still birth and fetal abnormalities like microsomia[13]

Rupture of membrane was seen in 8 women with vaginal delivery (8/33; 24.24%). 02 cases with cesarean section presented with rupture of membrane. Rupture of membrane may be described as a breach in the contiguity of membrane prior to onset of labor. It may occur due to physiologic weakening of membranes in conjunction with the excessive forces caused by uterine contractions. Factors which may contribute to rupture of the same also include vaginal bleeding, uterine over-distension, copper and ascorbic acid deficiency, connective tissue disorders, low BMI, habit of smoking and drug use[14]. In a study conducted by *Kayiga et al 2018* it was observed that out of 1425 women with rupture of membrane, 991 (69.5%) had vaginal delivery and 434 (30.5%) underwent Caesarean section. It was concluded that vaginal delivery is the preferred mode of delivery for cases with rupture of membrane after 28 weeks gestation as it is associated with lesser maternal and perinatal morbidity in comparison to caesarean delivery[15]3 women with gestational hypertension underwent vaginal delivery (3/33; 9%), whereas 02 underwent cesarean delivery. Gestational hypertension is defined as a new hypertension that appears at a gestational period of 20 weeks or more. It may or may not be associated with proteinuria, pre-eclampsia, and eclampsia. Complications associated with gestational hypertension are higher mortality rates, preterm delivery, low birth weight, asphyxia and still birth.*Weinster in 1982* introduced an entity with signs and symptoms different from severe preeclampsia and named it as HELLP syndrome. The condition is characterized by a triad of H: Haemolysis; EL: Elevated Liver enzymes and LP: Low Platelets. It is considered to be a complication of severe preeclampsia or it's variant[16,17] In a study conducted by Haroush et al 2005, it was observed that rate of cesarean delivery in

patients with pregnancy induced hypertension was higher than vaginal delivery[18]3 women with gestational diabetes underwent vaginal delivery (3/33; 9%), whereas 1 underwent cesarean delivery. Pregnancy may predispose to certain women to contract diabetes as pregnancy may lead to insulin resistance and hyperinsulinemia. Gestational diabetes is a common endocrinal complication in the obstetric practice worldwide. Gestational diabetes has been defined as glucose intolerance with first recognition or onset during pregnancy. WHO described diabetes mellitus in pregnancy or gestational diabetes mellitus as hyperglycemia first detected during pregnancy[19] Neonates born to mothers with gestational diabetes have more chances of macrosomia, hypocalcaemia, asphyxia, hypoglycemia, hyperbilirubinemia and respiratory distress[20] Only 1 woman with vaginal delivery presented with non reassuring fetal heart rate, whereas majority of them underwent cesarean delivery (7/17; 41.17%). Fetal heart rate is monitored using cardiotocography (CTG) and intermittent auscultation. Non reassuring fetal status is associated with protracted fetal tachycardia or bradycardia, presence

of repetitive or prolonged decelerations, and uterine tachysystole. The management ranges from intrauterine resuscitation to performing an emergency cesarean section for immediate delivery of a compromised fetus[21]

#### Conclusion

Our study clearly indicates that induction of labor doesn't necessarily increase the chances of cesarean section as most of the subjects in our study underwent vaginal delivery. Our results imply that induced labor at full term is acceptable, even if it is only for the convenience of the obstetrician or the pregnant woman. Labor induction in full term pregnancies with no complications may diminish the need for Cesarean delivery and the need for neonatal respiratory support or admission in Neonatal Intensive Care Unit. The limitations of the study included a smaller sample size, limiting the ability to generalize the result. An appropriately designed study on a larger scale is required to evaluate the effects of induced labor on both the mother and neonate.

**Table 1: Distribution of Patients by Age**

Group	N	Min	Max	Mean	SD	Median	t-test	P
Age	50	22	40	30.76	4.69	29.5	0.0034	0.5

**Table 2: Distribution of Gestational Age of Fetus**

Group	N	Min	Max	Mean	SD	Median	t-test	P
Gestational Age Of Fetus	50	37.1	41	39.138	1.12	39.14	0.050	0.480

**Table 3: Distribution of patients by Duration Of Labor**

Group	N	Min	Max	Mean	SD	Median	t-test	P
Duration Of Labor	50	03	20	8.24	3.80	8	0.0524	0.5

**Table 4: Distribution of Reasons for Labor Induction**

Reason for Labor Induction	No of Vaginal Birth	No of Cesarean Birth
Gestational HTN	03	02
Rupture Of Membrane	08	02
Post Dated	16	01
Non Reassuring FHR	01	07
Preeclampsia	-	04
Gestational Diabetes	03	01
Chronic HTN	02	-

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