Section: Obstetrics and Gyneaecology

Original Research Article

# COMPARATIVE ANALYSIS OF BLOOD LOSS IN VAGINAL DELIVERIES IN WOMEN WITH INDUCTION OF LABOR AND IN WOMEN WITH SPONTANEOUS ONSET OF LABOR-A PROSPECTIVE COHORT STUDY

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## Abstract

**Background:** Post-partum haemorrhage (PPH) affects approximately 2% of all women giving birth and remains a leading cause of maternal morbidity and mortality. Thus, in this study, we have compared the blood loss in vaginal deliveries of spontaneously progressing labor with vaginal deliveries following labor induction. Also, prepartum and post-partum Hb was compared. **Materials and Methods:** In this prospective cohort study, a total of 200 patients were included and allocated into two groups: Group A: 100 cases with full-term singleton pregnancies >37 weeks that underwent induction of labor were selected. GROUP B: 100 cases >37 weeks singleton pregnancies who spontaneously progressed into labor were selected. **Result:** Most of the patients in the study were between 21 to 30 years (79.5%), and 66.5% were primi. The mean gestational age of the study group was 38 weeks. The mean BMI of patients in the two groups was 27.7. Indications for induction were oligohydramnios (42%), post-dated pregnancy (24%), IUGR/oligo (6%), Rh-negative pregnancy (5%), precious pregnancy (1%), and PROM (20%). The modified bishop score in the spontaneous group was 5, 6, 7, and 8. In the induction group, it was 2, 3, 4, and 5. The average induction delivery interval was 22 hours. The mean blood loss in the spontaneous group was 180 ml, and in the induction group, 250 ml. The percentage of PPH in the spontaneous group was 2%, and in the induction, the group was 9%. **Conclusion:** Better and faster agents for labor induction must be used to reduce the induction delivery interval.

## INTRODUCTION

Post-partum haemorrhage (PPH) is defined by WHO as blood loss of 500 ml or more in vaginal deliveries and 1000 ml or more in cesarean deliveries with an increase in pulse rate and falling blood pressure. PPH affects approximately 2% of all women giving birth and remains a leading cause of maternal morbidity and mortality. All women carrying pregnancy beyond 20 weeks of gestation are at risk of developing PPH. In industrialized countries, PPH ranks in the top 3 causes of maternal mortality. Secondary PPH occurs after 24 hours up to 6 weeks after childbirth. The average labor induction rate is approximately 25% of all pregnancies. This study is designed to establish the rates of PPH occurring in the induction of labor compared to spontaneously progressing labor.[1-3] The major causes of primary PPH are uterine tony, genital tract trauma, retained placental fragments, and coagulation disorders.[3-6]

Thus, in this study, we have compared the blood loss in vaginal deliveries of spontaneously progressing labor with vaginal deliveries following labor induction. Prepartum and post-partum haemoglobin (Hb) were compared, and the amount of blood lost was assessed quantitatively and qualitatively. Also, the number of PPH that occurred in spontaneous deliveries and deliveries following induction are compared. Further, secondary outcomes like meconium-stained liquor, NICU admission, and length of hospital stay are also assessed in each group.


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## MATERIALS AND METHODS

It was a prospective cohort study conducted at government RSRM lying in a hospital between the period October 2019 to September 2020. A total of 200 patients were included and allocated into two groups as follows:

**Group A:** One hundred cases with full-term singleton pregnancies >37 weeks undergoing labour induction were selected. The amount of blood loss during their deliveries was measured quantitatively. Delta Hb was calculated from prepartum Hb and post-partum Hb. Secondary outcomes are the length of hospital stay, need for medical management, need for surgical management, and baby admission to NICU.

**Group B:** One hundred cases >37 weeks of singleton pregnancies who spontaneously progressed into labor were selected, and the same parameters were evaluated in this group also.

**Exclusion criteria**

Patients with breech presentation, placenta previa, multiple pregnancies, and known coagulation disorders. Patients who delivered by emergency cesarean section following induction of labor or otherwise.

Induction of labor was the stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes. Induction was done when the benefits to either mother or foetus outweighed that of pregnancy continuation. Recommended indications include membrane rupture without labor, gestational hypertension, oligohydramnios, non-reassuring fetal status, post-term pregnancy, and various maternal medical conditions such as chronic hypertension and diabetes (American College of Obstetricians and Gynaecologists, 2016). Induction or augmentation of labor was contraindicated when conditions that preclude spontaneous delivery were present.

## RESULTS

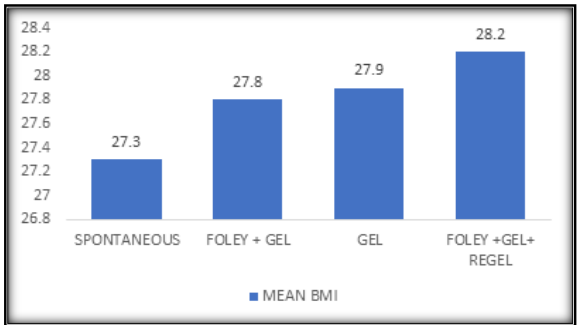


**Figure 1: Comparison of BMI between the groups for spontaneous, foley + gel, gel, and foley + gel + Re gel methods of induction**

We have compared BMI between the groups for spontaneous (n=100), foley + gel (35), gel (n=35), and foley + gel + Re gel (n=30) methods of induction, and a significant difference (p = 0.019) [Figure 1].

The mean induction delivery interval in foley followed by gel induction was 24 hours; in gel induction, it was around 7.5 hours; in foley induction followed by gel followed by regel induction, the mean induction delivery interval was 39 hours. There was a statistical significance, with a p-value of 0.001, in the induction delivery interval between the different methods of induction [Figure 2].

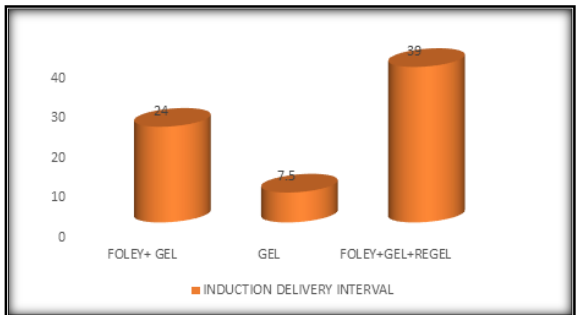


**Figure 2: Induction delivery interval**

There was statistical significance in comparing the blood loss between spontaneous and induction groups. Also, within the induction group, on comparing the various method of induction, there was a statistical significance in the amount of blood loss; the p-value was 0.004 [Figure 3].

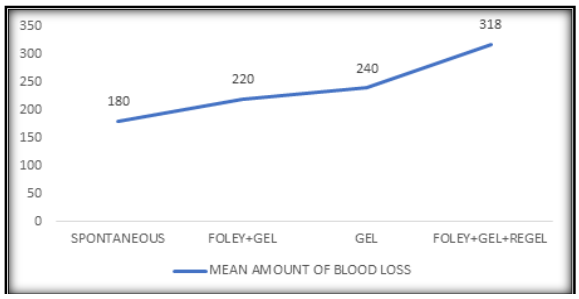


**Figure 3: Amount of blood loss**

We have compared the percentage of PPH between the groups for spontaneous, foley+gel, gel, and foley+gel+Re gel groups, and we have seen that percentage of PPH in spontaneous, foley+gel, gel, and foley+gel+Regel was 3%, 2%, 2%, and 5%, respectively [Figure 4].

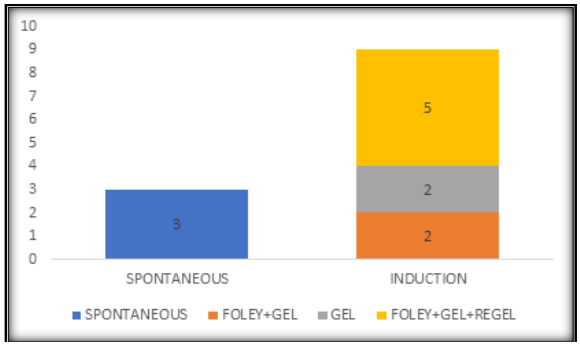


**Figure 4: Percentage of PPH**


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We have compared the number of cases for blood transfusion between the groups for foley+gel, gel, and foley+gel+Regel groups, and we have seen that number of cases in foley+gel, gel, and foley+gel+Regel was one in each group for PRBC 1 whereas for PRBC 2 some cases in foley+gel, gel, and foley+gel+Regel was 0, 1, and 2, respectively. We have observed a statistically significant difference in the number of cases of blood transfusion (p=0.045) [Figure 5].

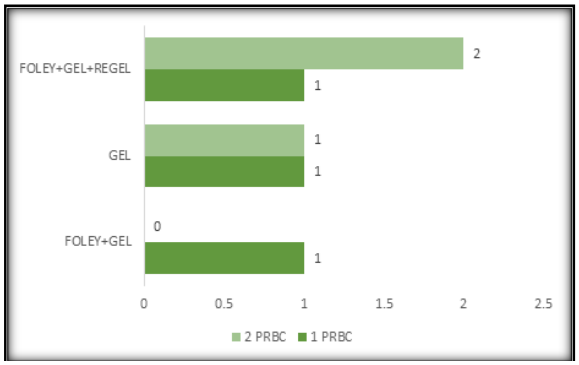


**Figure 5: Blood transfusion**

We have compared birth weight in the case of spontaneous and induction methods, and we have seen that number of babies in 2-2.5kg, 2.5-3 Kg, and >3 Kg were 19, 59, and 22 for spontaneous, whereas the number of babies was 24, 47, and 29 in the case of the induction method, respectively.

We have compared several NICU admission in the case of spontaneous and induction methods, and we have seen that number of babies admitted to NICU was 10% for the spontaneous whereas, in the case of induction, it was 38%.

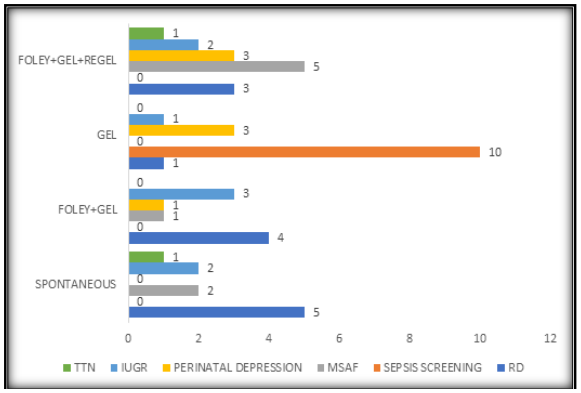


**Figure 6: Causes for NICU admission**

Five babies (2.5%) with respiratory distress were admitted from the spontaneous group and 8 (4%) from the induction group. With perinatal depression, 7 cases (3.5%) from the induction group were admitted. 2 babies (1%) from the spontaneous group and six babies (3%) from the induction group were admitted with meconium-stained liquor. With IUGR, two babies from the spontaneous group and six from the induction group were admitted to NICU. Ten babies (5%) from gel induction were admitted for sepsis screening. With TTN, one baby from the induction group and one from the spontaneous group were admitted. Comparing the two groups showed statistical significance concerning NICU admission (p =0.001) [Figure 6].

The mean prepartum Hb in the spontaneous and induction groups was 11.1 g, 11.3 g, respectively, and the mean post-partum Hb was 10.8 g and 10.9 g. Minimum post-partum Hb in the spontaneous group was 9 grams; in foley f/b gel induction, it was 8.7 grams; in the gel induction group, it was 8 grams; in the foley f/b gel f/b regel induction group, it was 8 grams [Figure 7].

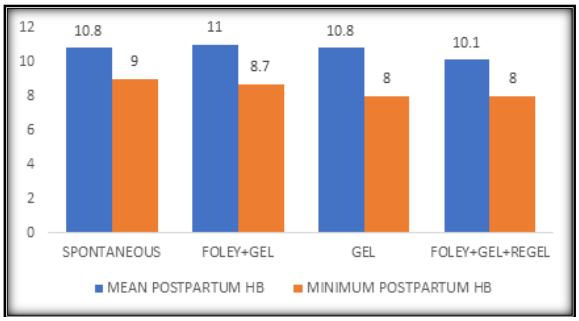


**Figure 7: Mean and minimum post-partum Hb**

## DISCUSSION

According to WHO statistics, haemorrhage and hypertensive disorders were among the top causes of maternal mortality in developing countries, accounting for more than 30% of all reported deaths. With the increasing number of deliveries conducted following labor inductions, a thorough investigation into the allegedly increased risk of post-partum haemorrhage associated with induced labor has become necessary. According to research, the number of inductions done roughly doubled between 1989 and 1997.[7,8]

Third-stage blood loss is thought to be greater in patients whose labor is stimulated with oxytocin induction or augmentation than in people who birth naturally. This is because the uterus, which contracts under the influence of the oxytocin hormone during the initial stage of labor, does not always contract after the baby is delivered and the placenta is expelled. However, prostaglandins outperform oxytocin induction because they can produce structural changes in the weakly ripe cervix, allowing for simple dilatation during the initial stage of labor. Hence, they are employed more frequently these days.[8] Another advantage is that they have several analogues and can be employed by many routes.[9] In several studies, labor induction with prostaglandins was related to reduced third-stage blood loss.[10]

Although there have been numerous research on the prevalence of primary post-partum haemorrhage in various labor inductions, the literature on the specific amount of blood loss that occurs during the third stage of labor is limited. A prior study


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conducted in the United States found that blood losses were higher in the oxytocin-treated group (333 298 mL) than in the control group (345 285 mL).[11] Brinsden and Clark from St Mary's Hospital in Portsmouth, Hampshire, found a mean blood loss of 235 mL in the induced group and 205 mL in the spontaneous group12. In our study, the mean blood loss in the spontaneous group was 180 ml, and in the induction group, 250 ml. The percentage of PPH in the spontaneous group was 2%, and in the induction, the group was 9%. Blood loss was comparatively higher in the induction category than in spontaneous delivery, and more bleeding occurred when the induction delivery interval was high.

Because visual measurement of blood loss frequently underestimates the amount of blood lost, a quantitative method must be used to determine precise blood loss. Blood loss after delivery must be carefully evaluated early on to prevent maternal morbidity and death. The faster the inducing medication takes effect, the shorter the induction delivery interval, the sooner the delivery, and the less haemorrhage. Early detection of post-partum haemorrhage, which is especially important in diseases like anaemia and preeclampsia, is mandatory when even modest amounts of blood loss are associated with disastrous results.

## CONCLUSION

Blood loss was comparatively higher in the induction category than in spontaneous delivery, and more bleeding occurred when the induction delivery interval was high. Visual estimation of blood loss often underrates the amount of blood lost, so a quantitative method has to be chosen to estimate accurate blood loss. Blood loss after delivery must be carefully assessed early to reduce maternal morbidity and mortality. Faster the action of the inducing agent, the shorter the induction delivery interval, the sooner the delivery, and the lesser the bleeding.

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