

# Comparison of Intravenous Oxytocin with Vaginal Prostaglandin E2 for Labor Induction in Pre-Labor Rupture of Membranes at Term

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## ABSTRACT

**Background:** Pre-labour rupture of membrane (PROM) at term is one of the most common demonstration for labour induction. PROM is the fissure of membrane before the arrival of orderly uterine shrinkage at term gestation. About 8% of the pregnant women have influence of this condition. PROM also occur when the amniotic sac which surround the fetus fissure before the onset of labour leading to the risk of maternal and fetal infection.

**Study design:** It is a randomized and controlled study conducted at Obs and Gynae Department, Civil Hospital, LUMHS, Jamshoro and Divisional Headquarters Teaching Hospital Mirpur Azad Kashmir for the duration of six months from February 2022 to July 2022.

**Material and Methods:** The study comprised of two groups. Each group had 30 patients. The patients that were not fulfilling the inclusion criteria were excluded from the study. The average age of patients in group 1 that is oxytocin induced was 25.4±5.4 years. Patients with prostaglandin E2 induction were included in group2 with average age as 24.7±4.5 years. Group1 had 35.9±4.2 while the average value for group 2 was 36.7±5.3.

**Results:** The induction active labor interval was 5.9±2.1 for Oxytocin induction group while for Prostaglandin E<sub>2</sub> induction group the value was 6.3±2.2. Whereas the induction delivery was 14.3±1.9 for Oxytocin induction group and 15.1±2.1 for Prostaglandin E<sub>2</sub> induction group.

**Conclusion:** It is concluded that oxytocin is a better drug for labor pain induction as compared to the prostaglandin in case of Pre-labour rupture of membrane at term. To route oxytocin via an intravenous pathway leads to a shorter delivery time and reduced rate of different infections in the mother.

**Keywords:** PROM at term, Intravenous oxytocin and vaginal prostaglandin.

## INTRODUCTION

Labour induction is a customary medical interference performed to speed up the labour process for pregnant women who are experiencing an elongate pregnancy or certain medical situation. Pre-labour rupture of membrane (PROM) at term is one of the most common demonstration for labour induction. PROM is the fissure of membrane before the arrival of orderly uterine shrinkage at term gestation. About 8% of the pregnant women have influence of this condition<sup>1-3</sup>. PROM also occur when the amniotic sac which surround the fetus fissure before the onset of labour leading to the risk of maternal and fetal infection. In these conditions prompt delivery is important to prevent the complications and ensure a healthy birth outcomes. The two customary methods of labour induction are the intravenous oxytocin and vaginal prostaglandin E2. The both the methods are effective in starting the labour but there is ongoing debate about which method is more productive and safer for the women with PROM. Intravenous oxytocin is a synthetic hormone that is used to induce and augment labour contractions. It works by stimulating the uterus to contract which in turn helps to dilate the cervix and facilitate the delivery of the baby<sup>4-5</sup>. Oxytocin is typically administered through an IV drip and can be adjusted according to the woman's individual response. Vaginal prostaglandin E2 is a hormone-like material formed naturally within the body that aids in the softening and ripening of the cervix in readiness for labour. It comes in a variety of forms, such as gels, tablets, and peccaries, and is inserted effectively into the vagina. Prostaglandin E2 appears to work by furthering the breakup of collagen fibers in the cervix, allowing the cervix to soften and efface, allowing the baby to pass through the birth canal more easily. Several studies<sup>6-8</sup> have been conducted to determine the efficacy and safety of these two methods of labour induction for women with PROM at term. While both methodologies have been proven to be beneficial in starting labour, some research suggests that vaginal prostaglandin E2 may be associated with a lower risk of hyper stimulation and foetal distress, as well as a reduced number of caesarean section. Researchers compared the outcomes of labour induction with intravenous oxytocin versus vaginal prostaglandin E2 for women with PROM at term in one

study published in the Journal of Obstetrics and Gynecology Canada. In the study, 153 women were randomly assigned to either intravenous oxytocin or vaginal prostaglandin E2 for labour induction. According to the findings of the study, both methods were equally effective in achieving vaginal delivery within 24 hours of induction<sup>9-10</sup>. However, the oxytocin group had a higher rate of hyper stimulation, and there was a trend towards a higher rate of caesarean section. The prostaglandin E2 group, on the other hand, had a higher rate of instrumental delivery, such as forceps or vacuum, but there were no cases of hyper stimulation or foetal distress.

## MATERIAL AND METHODS

The study comprised of two groups. Each group had 30 patients. The patients that were not fulfilling the inclusion criteria were excluded from the study. The average age of patients in group 1 that is oxytocin induced was 25.4±5.4 years. Patients with prostaglandin E2 induction were included in group2 with average age as 24.7±4.5 years. Group1 had 35.9±4.2 while the average value for group 2 was 36.7±5.3. According to the inclusion criteria following patients were included in the study:

- women who were between 37 and 41 weeks of gestation
- Women with a single fetus in cephalic presentation
- Women had pre-labor rupture of membrane for less than 24 hours.

According to the exclusion criteria following patients were excluded from the study:

- Women with the history of previous uterine surgery
- Women with any contraindication to labor induction
- Women with the fetal distress

Women in the oxytocin group received a prescribed dose of 2 mili units per minute, which was increased by 2 mili units per minute every 30 minutes until regular uterine compressions were ascertained. Women in the prostaglandin E2 group were given a 10 milligram tablet of vaginal prostaglandin E2 every 6 hours for a total of three doses. The proportion of women who delivered vaginally within 24 hours of induction was the primary efficacy measure. The mode of delivery, the rate of hyper stimulation, foetal

distress, and other maternal and neonatal outcomes were all secondary outcome measures.

**RESULTS**

The study was carried out to find the comparison between intravenous oxytocin with the vaginal prostaglandin E2 for inducing labor in case of pre labor rupture of membranes at term. The average gestational age in weeks is shown in table no.1 for both groups. group1 had 35.9±4.2 while the average value for group 2 was 36.7±5.3. the parity of patients was also analyzed, with group 1 having 9 (33%) Primigravida patients and 20 (66%) multigravida patients. while group 2 had 15 (51%) Primigravida and 14 (49%) multigravida patients. There were 18 (61%) patients in group 1 that were from rural area while group 2 had 17 (59%) from rural area.

Table 1: Different variables of participating patients

Variables	Group 1 (n=30)	Group 2 (n=30)
Average age (years)	25.4±5.4	24.7±4.5
Mean BMI (kg/m <sup>2</sup> )	24.2±7.8	26.1±6.8
Average gestational age (weeks)	35.9±4.2	36.7±5.3
Parity		
Primigravida	9 (33%)	15 (51%)
Multigravida	20 (66%)	14 (49%)
Residency		
Rural	18 (61%)	17 (59%)
Urban	11 (39%)	12 (41%)

Table no.2 shows the comparison of induction delivery interval and the interval of induction active labor. The induction active labor interval was 5.9±2.1 for Oxytocin induction group while for Prostaglandin E<sub>2</sub> induction group the value was 6.3±2.2. whereas the induction delivery was 14.3±1.9 for Oxytocin induction group and 15.1±2.1 for Prostaglandin E<sub>2</sub> induction group.

Table 2: Comparison of induction delivery interval and induction active labor interval

	Average duration of induction active labor interval (SD) (hr)	Average duration of induction delivery interval (SD) (hr)
Oxytocin induction group	5.9±2.1	14.3±1.9
Prostaglandin E <sub>2</sub> induction group	6.3±2.2	15.1±2.1

The comparison of signs of chorioamnionitis between both groups was also analyzed as it was found that between both groups only 1 patient from Oxytocin induction group showed chorioamnionitis while in the Prostaglandin E<sub>2</sub> induction group 4 patients showed signs of chorioamnionitis.

Table 3: Comparison of signs of chorioamnionitis between both groups

	Yes	No
Oxytocin induction group	1	29
Prostaglandin E <sub>2</sub> induction group	4	26

**DISCUSSION**

Obstetrician issues cause immature rupturing of the membrane and may lead to different complications like complex operative processes, mortality, and morbidity of the newborn. Much trouble about obstetricians is that the literature availability is only about the more developed countries, where the available resources are much better for mothers and newborns, and they are treated with suitable antibiotics and authentic protocols<sup>11-13</sup>. However, in developing countries resources are limited and not of good quality. In Pakistan, a developing country the morbidity rate is much higher due to a lack of resources. In developing countries, the PROM strategy was used but with the passage of time, different changes in this strategy took place as per requirement. This improvement was required and management rules were updated to provide mothers and newborns with better facilities to reduce the mortality rate and to treat different complications. For the improvement of

perinatal outcomes, many institutes are going to accept induction at a very early stage to cope with PROM<sup>14-15</sup>. As a result of instant induction, the woman undergoing PROM suffers from less pain, and the membrane ruptured more easily. It also decreases the delivery time of the baby. This study is about oxytocin (intravenous) comparison with the prostaglandin of the vagina (E<sub>2</sub>), and their role in the involvement of labor pain induction in the woman having PROM. The relation between the induced delivery method and chorioamnionitis risk is also discussed in this study. The literature survey narrates that intravenous oxytocin was used in ancient times to induce labor in women having PROM. The oxytocin drug is safe when it is used in a controlled manner and it is inexpensive. The latest research<sup>16-17</sup> survey also supports the fact of oxytocin as a labor inducer, it is a gold standard drug for the induction of labor pain in PROM. In case of a more complicated situation, i.e. unripped cervix, prostaglandins are employed for the initiation of labor pain.

This comparative study was done on two groups. One group was treated with oxytocin for induction and in the other group prostaglandin was used as an inducer, each group comprises 30 patients. Average age of patients in group 1 that is oxytocin-induced was 25.4±5.4, while the average age of the group 2 patients treated with prostaglandin was 24.7±4.5. The average gestational age in weeks for group 1 was 35.9±4.2, while the average value for group 2 was 36.7±5.3. The parity of patients was considered, with group 1 having 9 (33%) Primigravida patients and 20 (66%) multigravida patients. While group 2 had 15 (51%) Primigravida and 14 (49%) multigravida patients. There were 61% of patients in group 1 that were from the rural area while group 2 had 59% from the rural area. A study conducted in Italy<sup>18-20</sup> supports that oxytocin is a better drug as compared to vaginal prostaglandin in the case of PROM. According to this study, oxytocin leads to short interval birth and it is safe to use for mothers and also prevents different kinds of infections in mother and baby as compared to prostaglandin. A significant difference was observed in different parameters of both groups treated with oxytocin and prostaglandins, respectively. All the relative parameters declare that oxytocin is cheap and safe as compared to prostaglandin. Our study exactly follows the same results only a minor difference was found but the overall inference remains the same. The difference among the values is due to the small population size in our study, and different hormonal imbalance among the individuals under study.

The main complication due to PROM is chorioamnionitis. The risk rate of chorioamnionitis was also measured in two groups treated with oxytocin and prostaglandin. The risk rate of this complication is much higher in the case of prostaglandin drug, only negligible risk exists in the case of oxytocin drug, which indicates that oxytocin is much more efficient and safer as compared to prostaglandins and a number of studies<sup>21-22</sup> also supports this hypothesis. However, prostaglandin reduces the chances of a C-section rate and leads to the delivery of the baby via the normal pathway. This hypothesis is given by a research group with proper results validation.

**CONCLUSION**

From this study, it is concluded that oxytocin is a better drug for labor pain induction as compared to the prostaglandin in case of Prelabor rupture of membrane at term. To route oxytocin via an intravenous pathway leads to a shorter delivery time and reduced rate of different infections in the mother. One of the major complications of PROM is chorioamnionitis, which is greatly reduced by oxytocin as compared to prostaglandin. One of the major advantages of oxytocin drug is, its easy access and it is cheaper as compared to prostaglandin.

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