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Original Article

Maternal Outcome Following Intra-Vaginal Administration of Misoprostol for Induction of labor

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ABSTRACT

Introduction: *The use of prostaglandin preparations with or without oxytocin infusion is widely recognized and accepted as a standard method of induction of labor. It has been shown to reduce induction time and the risk of failed induction. But the use of prostaglandin E2 is quite expensive and is not available in many developing countries. In such cases, misoprostol can also be used as an induction agent. Research regarding the complications and successful outcome rate of using misoprostol as a labor inducing agent is scarce. The present study was conducted to observe the maternal outcome of using misoprostol intravaginally as a method for inducing labor and cervical ripening.* ***Aim of the study:*** *The aim of the study was to observe the maternal outcome of patients following intra-vaginal administration of misoprostol for induction of labor.* ***Methods:*** *This open clinical trial study was conducted at the Department of Obstetrics and Gynaecology, North East Medical College Hospital, Sylhet, Bangladesh. The study duration was 1 year and was conducted with a total of 100 patients who were admitted with term pregnancy and unfavorable cervix in the study hospital, fulfilling the inclusion and exclusion criteria.* ***Result:*** *The age of the participants ranged from 18 to 32 years, with the mean age being 22.4 (SD ± 2.9) years. Bishop's score increased significantly after 6 hours vaginal misoprostol. 53% were multipara and 47% primipara. The mean induction to vaginal delivery time was 14.6 (SD ± 4.6) hours (range 6 to 23 hours); the induction to vaginal delivery time was<12 hours in 44.3% and 12-24 hours in 55.7% cases. The mode of delivery was vaginal in most of the cases (70.0%) and cesarean section was in 30.0% of cases. Fetal distress was the most frequent indication of cesarean section (63.3%), followed by arrested labor (20.0%) and failed induction (16.7%). The maternal obstetric complication was postpartum hemorrhage (3.0%) with no ruptured uterus, tachysystole, hypertonus uterus, or hyperstimulation.* ***Conclusion:*** *The average induction to vaginal delivery time varied from 6 to 23 hours, with a delivery time of 14.6 (SD 4.6) hours; the induction to vaginal*

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delivery time was 12 hours in 44.3 percent of cases and 12-24 hours in 55.7 percent. Vaginal birth was the most frequent mode of delivery, while fetal distress was the most prevalent reason for cesarean section. When compared to previous similar research, maternal obstetric problems were much reduced. Vaginal misoprostol appears to be a viable treatment for labor induction with minimal maternal problems.

Keywords: *Induction, Misoprostol, Cervix, Intravaginal, Prostaglandins*

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INTRODUCTION

If the mother or fetus is at danger if the pregnancy is allowed to continue, induction of labor may be required. Maternal condition, fetal condition and gestational period, cervical ripening, and bony pelvic dimension all impact the decision between Cesarean Section and induction of labor. The uniformity, compliance, and arrangement of the cervix are critical to the effectiveness of induction. Women with an unfavorable cervix require labor to be induced in around 10% of all pregnancies. When labor is induced in an unripe cervix, there is a higher-than-normal rate of induction failure, extended labor, assisted delivery, and cesarean section.[1] Labor induction in the presence of an unfavorable cervix is sometimes protracted and laborious, and it is a well-known barrier to the effectiveness of labor induction.[2] A simple effective way of ripening the cervix prior to induction is definitely useful. Several procedures have been tried to ripen the cervix prior to induction of labor in order to boost the success rate.[1] It is widely accepted that induction of labor may be difficult and frequently fails in cases of an underdeveloped cervix. The use of medicines to ripen the cervix before to standard induction methods is becoming more widespread. Cervical ripening and labor induction are both treated with prostaglandin E2 gel. These, however, are expensive and must be stored in a refrigerator at temperatures ranging from 2 to -80 degrees Celsius, with a half-life of 18 months. Furthermore, many underdeveloped nations, like Bangladesh, do not have access to prostaglandin E2 tablets.[3] The most often utilized medications for inducing labor are oxytocin and prostaglandins (PGs). Although oxytocin is well recognized as a safe and effective uterine contraction initiator, its efficacy is dependent on the status of the cervix at the time of induction. Cervical ripening medications are frequently used before starting oxytocin treatment in a lady with an unfavorable cervix.[4] Numerous investigations have demonstrated that locally administered prostaglandins (PG), primarily PGE 2 and PGE 1, improve cervical compliance and dilatation.[5] However, hazards connected with the use of prostaglandins frequently include uterine hyperstimulation in conjunction with variations in fetal heart rate (FHR).[6]-[8] Misoprostol usage carries its own set of risks. Uterine hyperstimulation and uterine rupture are major risks with large dosages of misoprostol.[9] Misoprostol is a synthetic PGE1 analog that is a safe and low-cost cervical

ripening medication.[10]-[12] Misoprostol offers a variety of benefits in clinical obstetric and gynecologic applications. It is around 100 times less expensive than other prostaglandins, has a long shelf life, is simple to give, and does not require refrigeration. Furthermore, it is registered in over 80 countries, including Bangladesh, and hence widely available.[1],[13] The goal of this study is to investigate the efficacy and safety of intra-vaginal misoprostol administration in the induction of labor by examining successful induction cases following intra-vaginal misoprostol administration.

OBJECTIVE

General Objective

- To observe the maternal outcome of patients following intra-vaginal administration of misoprostol for induction of labor.

METHODS

This open clinical trial study was conducted at the Department of Obstetrics and Gynaecology, North East Medical College Hospital, Sylhet, Bangladesh. The study duration was 1 year, from 1st January 2011 to the 31st of December, 2011. The sample size for this study was determined to be 96 by using Cochran's formula considering a 5% level of significance, but in this study, 100 patients with term pregnancy and unfavorable cervix and fulfilled the inclusion and exclusion criteria were enrolled. All patients admitted with term pregnancy and unfavorable cervix in the study hospital, fulfilling the inclusion and exclusion criteria were enrolled as the study population in this study. A consecutive, convenient and purposive sampling technique was applied to collect the sample. After admission of the patients, history was taken and clinical examination was done. Informed written consent was obtained from each of the patients, and ethical approval was obtained from the ethical review committee of the study hospital. One hundred women were assigned to receive 50µgm intra-vaginal misoprostol intravaginally. Assessment of cervix was done before application of medication and documented. For women who were selected for vaginal misoprostol, an initial dose of 50µgm was applied in the posterior vaginal fornix. If labor did not establish within 6 hours subsequent doses of 50µgm were applied 6 hourly maximum up to 4 doses. After delivery, both the mother and neonate were followed for 48 hours or until hospital discharge, whichever came sooner. All relevant necessary information and clinical data were recorded in a pre-designed datasheet.

Inclusion Criteria

- Patients with term pregnancy with single-tone baby without labor pain
- Patients who had given consent to participate in the study.
- Cephalic presentation
- Adequate pelvis
- Bishop score < 6
- Patients with IUFD, GDM (Size baby 2.5 – 3.5 kg, estimated by

USG), Post-dated pregnancy, Pre-eclampsia, eclampsia, Rh-negative mother.

Exclusion Criteria

- Pregnancy less than 37 weeks
- Cephalopelvic disproportion
- Previous cesarean section or myomectomy or hysterotomy
- Antepartum hemorrhage
- Grand multipara (≥4)
- Vaginal infection
- Known hypersensitivity to prostaglandin
- Unable to answer the criteria question.
- Exclude those affected with other chronic diseases etc.

RESULTS

The age of the participants ranged from 18 to 32 years, with the mean age being 22.4 (SD ± 2.9) years. Bishop's score was significantly raised after 6 hours vaginal misoprostol [4.63 (SD ± 1.17) VS 5.82 (SD ± 1.60); p<0.001]. 53% were multipara and 47% primipara. The mean induction to vaginal delivery time was 14.6 (SD ± 4.6) hours (range 6 to 23 hours); the induction to vaginal delivery time was<12 hours in 44.3% and 12-24 hours in 55.7% cases. The mode of delivery was vaginal in most of the cases (70.0%) and cesarean section was in 30.0% of cases. Fetal distress was the most frequent indication of cesarean section (63.3%), followed by arrested labor (20.0%) and failed induction (16.7%). The maternal obstetric complication was postpartum hemorrhage (3.0%) without any ruptured uterus, tachysystole, hypertonus uterus, or hyperstimulation. The maternal side-effects were nausea or vomiting (5.0%), diarrhea (2.0%), and fever (1.0%).

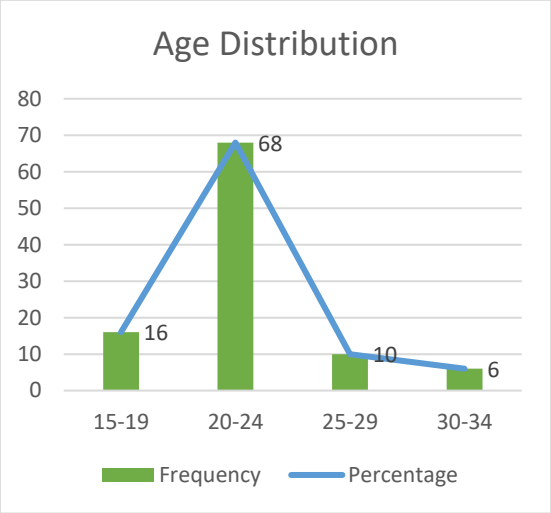

Figure 1: Distribution of the patients by age group (n=100)

The age of the patients ranged from 18 to 32 years with a mean age of 22.4 (SD ± 2.9) years. Figure 1 showed the distribution of the patients based on age group. There were 68 (68.0%) patients in the age group of 20-24 years, 16 (16.0%) patients in the age group of 15-19 years, 10 (10.0%) patients in the age group of 25-29 years, and 6 (6.0%) patients in the age group of 30-34 years.

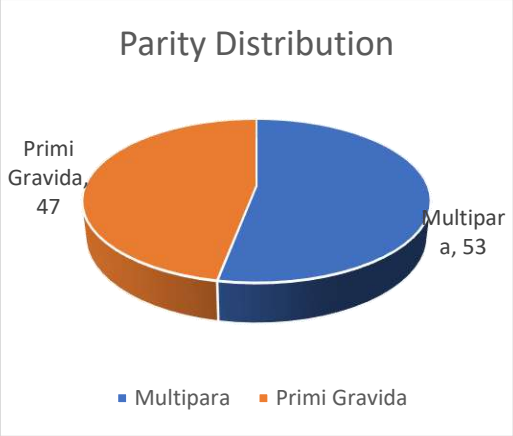

Figure 2: Parity distribution of the participants (n=100)

47% of the women were primigravida, or pregnant for the first time, while the remaining 53% had experience giving birth at least once before.

Table 1: Distribution of the patients by causes of induction (n=100)

Indication of induction	Frequency	Percentage
Postdated pregnancy	63	63.0
Pregnancy Induced Hypertension	24	24.0
Gestational Diabetes Mellitus	5	5.0
Intrauterine Fetal Death (diagnosed before induction)	8	8.0
Total	**100**	**100.0**

Distribution of the patients on the basis of causes of induction was shown in table-3.1. Post-dated pregnancy was the most frequent indication of induction (63.0%), followed by pregnancy-induced hypertension (24.0%), intrauterine Fetal death (diagnosed before induction) (8.0%), and gestational diabetes mellitus (5.0%).

Table 2: Distribution of the patients by Bishop's score before and 6 hours after induction (n=100)

Bishop score	Before induction	6 hours after induction	p-value
Mean	3.32	5.82	*p<0.001)
Standard deviation	0.96	1.60	
Range	2-5	2-8	

*Paired t-test was done to find out the level of significance.

Bishop's score before induction (vaginal misoprostol) ranged from 2 to 5 with the mean of 3.32 (SD ± 0.96) and Bishop's score 6 hours after induction (vaginal misoprostol) ranged from 2 to 8 with the mean of 5.82 (SD ± 1.60). Bishop's score was significantly raised 6 hours after vaginal administration of misoprostol (p<0.001). Table-3.2 showed the distribution of the patients by Bisop score before and 6 hours after induction.

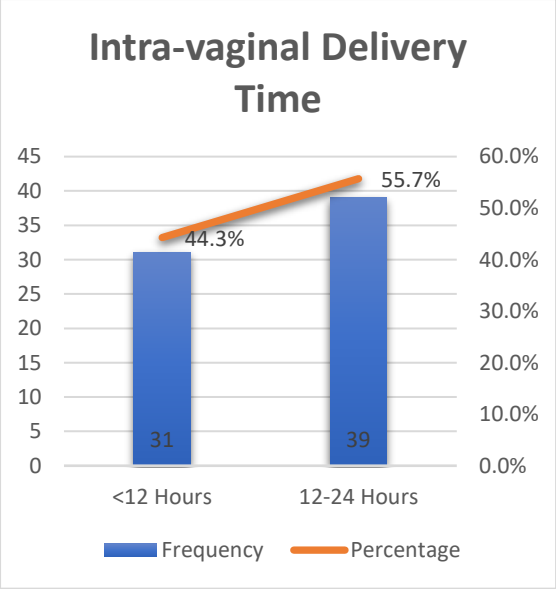

Figure 3: Distribution of the patients by induction to vaginal delivery time (n=70)

The induction to vaginal delivery time ranged from 6 to 23 hours with the mean of 14.6 (SD ± 4.6) hours. Figure 2 showed the distribution of the patients by induction-vaginal delivery time. Induction-vaginal delivery time <12 hours was in 31 patients (44.3%) and 12-24 hours in 39 patients (55.7%).

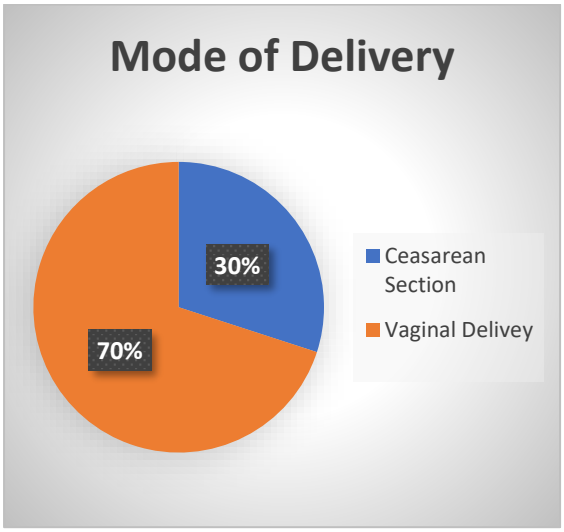

Figure 4: Distribution of patients according to mode of delivery (n=100)

Figure 3 showed the distribution of patients according to the mode of delivery. Mode of delivery was vaginal in most of the cases [70 (70.0%) and cesarean section in 30 patients (30.0%)].

Table 3: Distribution of patients according to the indication of cesarean section (n=30)

Indication of cesarean section	Frequency	Percentage
Fetal distress	19	63.3
Failure to progress of labor	6	20.0
Failed induction of labor	5	16.7
Total	30	100.0

Fetal distress was the most frequent indication of cesarean section (63.3%), followed by arrested labor (20.0%) and failed induction (16.7%). The distribution of patients according to the indication of cesarean section was shown in table-3.

Table 4: Distribution of patients by characteristics of labor and maternal outcome (n=100)

Variables	Frequency	Percentage
Labor		
Oxytocin augmentation	23	23.0
Tachysystole	0	0.0
Hypertonus uterus	0	0.0
Hyperstimulation	0	0.0
Maternal outcome		
Postpartum hemorrhage	3.0	3.0
Ruptured uterus	0	0.0

Distributions of patients by characteristics of labor and maternal outcome were shown in table 4. During labor, oxytocin augmentation was required in 23.0% cases and postpartum hemorrhage in 3.0% cases but no ruptured uterus, hyperstimulation, tachysystole, or hypertonus uterus.

Table 5: Distribution of patients by maternal side-effects (n=100).

Maternal side-effects	Frequency	Percentage
Nausea/vomiting	5	5.0
Diarrhoea	2	2.0
Fever	1	1.0

Maternal side-effects observed were nausea or vomiting in 5.0%, diarrhea in 2.0%, and fever in 1.0%.

DISCUSSION

Labor is the transition of the fetus from the intrauterine to the extrauterine environment. It is a clinical diagnostic that is described as the start and maintenance of uterine contractions with the intention of causing increasing cervical effacement and dilation. The precise processes behind this process are yet unknown. Induction of labor is the technique of inducing uterine contractions using medicinal or surgical procedures prior to the commencement of spontaneous labor. Over the recent years, the rate of induction of labor has been on the rise, due to various medical factors, along with the increasing knowledge that if the cervix remains unripe, a normal vaginal birth might be impossible, or might lead to multiple complications.[14] Cervical ripening, or induction of labor can be achieved by various methods, including non-pharmacological ones. Herbal supplements like black haw, black and blue cohosh, primrose oil, and red raspberry leaves are quite commonly prescribed in many areas of the world to induce labor, especially by midwives or traditional birth attendants.[15] Hot baths and castor oil ingestion can also be used to induce labor, but presently np clinical studies have been conducted to observe the efficacy of such methods.[16]-[17] Among the pharmacological methods, the use of prostaglandin E2 is the most common in the developed world. It is extremely expensive, needs to be

maintained under a controlled temperature, and can be hard to obtain outside of the developed countries.[3] Misoprostol, on the other hand, is about 100 times cheaper than other prostaglandins, can be found in almost all over the world, including Bangladesh, and does not require strict guidelines to be maintained. The present study was conducted with a total of 100 patients who received intravaginal misoprostol for cervical ripening and induction of labor. The patients in this research varied in age from 18 to 32 years old, with a mean age of 22.4 (SD 2.9) years. This was consistent with the findings of Abbasi et al, who discovered that the average age was 22 (SD5.2) years.[18] The mean age was comparable but significantly higher in a few other similar investigations.[1],[19],[20] Observing the indications of induction of labor among the 100 research participants, postdated pregnancy was the most common, accounting for 63.0 percent of instances. 24 percent had hypertension, 8.0 percent experienced intrauterine fetal loss (discovered before induction), and the remaining 5% had gestational diabetes mellitus. These findings were consistent with those of Chowdhury et al, who discovered comparable evidence of induction.[19] The Bishop's score, a medical metric used to estimate how long until possible labor, was tested before induction and 6 hours after induction for the patients. Bishop's score before induction (vaginal misoprostol) varied from 2 to 5, with a mean of 3.32 (SD 0.96) and a score 6 hours after induction (vaginal misoprostol) of 5.82 (SD 1.60). The improvement in the Bishop's Score was statistically significant. Agarwal's study found a comparable level of relevance.[2] Wing et al found that the Bishop's score improved significantly 3 hours after the intervention.[21] In their investigation, the mean score before and after the intervention was 2 and 4, respectively. Buser et al employed 50 mg of intravaginal misoprostol in a study similar to ours and found a mean improvement of 3.52.1 from the pre-induction score.[22] Patients in our trial were given subsequent doses if the initial 50 mg dosage did not result in the predicted improvement. Prior to the study, 53 percent of the current study participants had given birth at least once (multipara), while the remaining 47 percent were giving birth for the first time. This was consistent with numerous prior studies that found a high proportion of multipara individuals,[18],[19] although two previous studies found a larger proportion of primigravida patients.[1],[23] The period from induction to vaginal delivery ranged from 6 to 23 hours, with a mean of 14.6 (SD 4.6) hours. Several more investigations yielded very identical results.[24],[25] Induction to vaginal delivery took 12 hours in 31 patients (44.3 percent), and 12-24 hours in 39 individuals (55.7 percent). Fetal discomfort was the most common indication for the 30 patients who underwent cesarean surgery, occurring in 63.3 percent of instances. The remaining 5 patients (16.7 percent) had unsuccessful induction of labor, while 20% had halted labor. These findings were comparable to those of Chowdhury et al.[19] Observing the labor and mother outcomes of the 100 participants in our

study, we discovered that oxytocin augmentation was necessary in 23.0 percent of cases, with postpartum hemorrhage occurring in 3.0 percent of the patients. In our investigation, no ruptured uterus, hyperstimulation, tachysystole, or hypertonus uterus were found. This was significantly better than in several other research where similar issues were also documented.[12],[19] Maternal side effects were found in 8% of the individuals in this research. 5% of patients reported nausea or vomiting, 2% had a fever, and 1 patient had a fever. These ratios were significantly lower than in earlier research.[12],[26] Maternal outcomes were favorable in 97 percent of instances, which was higher than in many previous trials.

Limitations of the Study

The study was conducted in a single hospital with small sample size. So, the results may not represent the whole community.

CONCLUSION

Bishop's score improved dramatically after 6 hours of vaginal misoprostol. The average induction to vaginal delivery time varied from 6 to 23 hours, with a delivery time of 14.6 (SD 4.6) hours; the induction to vaginal delivery time was 12 hours in 44.3 percent of cases and 12-24 hours in 55.7 percent. Vaginal birth was the most frequent mode of delivery, while fetal distress was the most prevalent reason for cesarean section. When compared to previous similar research, maternal obstetric problems were much reduced. Finally, vaginal misoprostol appears to be a viable treatment for labor induction with minimal maternal problems.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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