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**Original Research Article** 

# COMPARATIVE STUDY BETWEEN OXYTOCIN AND PROSTAGLANDIN IN INDUCTION OF DELIVERY IN POST TERM PREGNANCY

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#### Abstract:

Induction of delivery using medication can be performed by stimulating uterine contractility for establishing delivery prior to the start of spontaneous labor. Two most common ecbolic are Oxytocin and prostaglandins analogues (PGs) e.g. misoprostol. *The study aims* to compare between the effects of oxytocin & misoprostol in ripening of the cervix and induction of delivery in postdate pregnancy. *Results show* that the induction delivery period mean was significantly higher when using misoprostol than when using oxytocin. No significantly different results between the both groups regarding uterine hyperstimulation. No significantly different results between the both groups regarding postpartum hemorrhage. No significantly different results between the both groups regarding the mode of delivery. No significantly different results between the both groups regarding the mean of Apgar score at 1 and 5 minutes. No significantly different results between the both groups regarding meconium aspiration. No significantly different results between the both groups regarding emergency Cesarean section rate due to fetal distress (pathological fetal heart rates) between the two groups. There was no significant difference between the two groups as regards the neonatal admission to the intensive care unit (N.I.C.U). *It is concluded* that Usage of both IV oxytocin 5 mIU/minute & vaginal misoprostol 25 µg is safe to induce delivery. It is preferable to use IV oxytocin 5 mIU/minute if the time factor is considered.

**Keywords**: oxytocin, prostaglandin, induction of delivery, postdate pregnancy

## Introduction:

Induction of delivery means stimulating contractility via iatrogenic to establish delivery before the start of spontaneous delivery. One famous indication for induction of delivery is postdate pregnancy with a gestational age proceeding 40 weeks. The value of that induction is the reduction of the probable perinatal mortality. (Galal, 2012) The goal is to decrease the number of CS operations done for failure of induction in ladies who show slow progress as they remain in the latent phase of delivery. As soon as induction passes to active labor, the progress must be compared to the corresponding progress in during spontaneous active labor. Induction of delivery using medication involves stimulating uterine contractility for production of delivery before the start of spontaneous delivery. Two most common ecbolic are Oxytocin and prostaglandins analogues (PGs) e.g. misoprostol. (Kramer, 1997)

# Literature review

Indications for induction include: Hypertensive disorders with pregnancy, Maternal diabetes with pregnancy, Postdate pregnancy, Severe cases of chorea gravidarum, Intrauterine growth retardation after lung maturity, Intrauterine fetal death with no spontaneous delivery, Recurrent intrauterine fetal antenatal deaths, Congenital

anomalies incompatible with life, Some cases of Pre mature rupture of the membranes, Rh isoimmunization & severe polyhydramnios and Social or geographic reasons. (ACOG, 2013) One famous indication to induce delivery is postdate pregnancy that exceeds 40 weeks. This induction might lead to reduction of probable perinatal death. (Gülmezoglu, 2012) Complications of Induction of delivery include hyperstimulation that can be defined as a persistent form of 6 contractions or more in ten minutes, uterine contractility persisting minimally 2 minutes, or uterine contractility with normal time length that occur in 1 minute of each other, accompanied or not changing heart rate of the fetus. (Hofmeyr, 2010) another complication is hyperstimulation syndrome has been used to describe hyperstimulation or tachysystole associated with fetal heart rate abnormalities. (ACOG, 2009) There are no parameters to detect induction failure. It is essential to provide sufficient period for the cervix to ripen and to develop the active labor pattern as a pre-exquisite to determine failure of the induction process. The value of allowing sufficient period for progressing to the active phase from the latent phase of delivery was demonstrated in various researches. In the study of (Johnson, 2003), the mean time of latent phase of delivery in a lady with a Bishop Score (0-3) was twelve hrs. in multiparous women & 16 hrs. in nulliparous women. In a second research, requiring a minimum of twelve hours of giving oxytocin following rupture of membrane prior to diagnose failure of induction of delivery led to vaginal delivery in 75% of nulliparous women and removed inducing delivery failure from indications for CS in multiparous ladies (Rouse, 2011)

At or near term Oxytocin proves more effective. On pregnant uterus ready synthetic oxytocin produces all pharmacological effects made by the internal hormone. The uterine response to oxytocin depends upon the length of pregnancy; it increases as the third trimester progresses. During early pregnancy, only very high dosage of oxytocin produces uterine contractility. Oxytocin is mostly efficient at or near to date. It selects uterine smooth muscular cells to be stimulated via enhancement of Na permeability of membranous myofibrils. This produces periodic uterine contractility. In addition, the rate and power of present contractility is increased by oxytocin. (Williams, 2000).

Misoprostol is a PG E1 analogue that is used for prevention NSAID- induced peptic ulcer. It became a useful drug in obstetrical and gynecological practices due to its ability to ripen the cervix and to promote uterine contractility. Misoprostol has high flexibility & convenience due to its tablet formula and its stability and it can be given via mouth, sublingual, vaginal and rectal routes. Since it was abandoned from eliciting unlawful miscarriage in the late 1980, it turned rapidly as highly efficient medication to end pregnancy in the 1<sup>st</sup> & 2<sup>nd</sup> Trimester (Tan, 2010). Misoprostol can induce or augment uterine contractility, through interaction with the cellular myometrial receptors causing powerful cellular myometrial contractility that lead to embryo expulsion or tissues of the fetus. It also results in cervical softening and dilatation.

### Methodology

This study is randomized controlled, prospective study; patients were recruited from those who were candidate for labor induction at term. I targeted the low risk patients with favorable cervices prior to induce delivery. After enrollment of the patients into the study, they were assigned into one of the two groups of the study:

- Group (A) (oxytocin): 40 women that were subdivided into 1) Primigravida, 20 women and 2) Multigravida, 20 women, All patients received oxytocin infusion in 500 ml of 5% dextrose starting with 5 mlU/minute, the infusion rate was increased every 45 minutes by 5 mlU/minute if no satisfactory contractions was achieved i.e. 3 contractions in 10 minutes, the maximum infusion rate was 40 mlU/minute.
- Group (B) (misoprostol): 40 women that were subdivided into 1) Primigravida, 20 women and 2) Multigravida, 20 women, the physician in the delivery location gave all patients received 25µg misoprostol inserted high in the posterior fornix (given every 4 hrs. for a maximum of 3 doses or until active labor started)

The next dose was administered if there were no uterine contractility. The dose was stopped **when** active labor started which is defined as occurrence of three or more uterine contractions in ten minutes and or dilatation of the cervix at least 3 cm, or **when** Maximum dose of the drug was 3 doses of misoprostol

The *1ry outcome* measure was the induction-delivery period (duration from inserting the drug to deliver), while *2ary outcomes* monitor: uterine hyperstimulation, mode of delivery, abnormal patterns of fetal heart rate, Apgar score at 1-5 minutes, NICU admissions and meconium aspiration.

#### **Results & discussion**

**Table 1:** Comparison between both groups as regards induction delivery period

Induction delivery interval	Oxytocin	Misoprostol
Mean (hour)	9.83	11.76
SD	0.99	0.94
P value	<0.05	

P<0.05 significant

There was statistically significant difference between both groups as regards the mean of induction delivery period, as the mean is higher when using misoprostol (11.76  $\pm$  0.94) than that of oxytocin group (9.83  $\pm$  0.99), (P<0.05) as shown in table(1). This goes with (Escudero, 1997), but opposite to both (Sanchez, 1997) and (Tabasi, 2007) while (Zeteroglu, 2009) found no corresponding significant difference. One of the factors that affect the I.D.I is the dose of misoprostol. Studies used 50µg misoprostol show shorter I.D.I compared with other studies - including this study - used 25µg. (Sanchez, 2002). Another factor affects the I.D.I is the interval time between misoprostol doses. Studies used shorter interval time (3-4 h) between misoprostol doses show shorter I.D.I compared with other studies - including this study - that used long interval time ( 6h or more). (Pongsatha, 2002) Third factor affects the I.D.I is Cervical ripping state before induction. Studies included patients with Bishop Score < 6 show shorter I.D.I compared with other studies - such as this study - that included patients with Bishop Score > 6. (Bugalho, 1995)

**Table 2:** Comparing both groups as regards delivery mode

MOD	Oxytocin		Miso	Misoprostol		l	P Value
	N	%	N	%	N	%	
CS	8	20.0	7	17.5	15	18.75	0.754
VD	32	80.0	33	82.5	65	81.25	

P>0.05 insignificant

In the oxytocin group, 32 cases (80%) were delivered vaginally and 8 cases (20%) were <u>delivered by Cesarean section</u>, when using misoprostol, 33 cases (82.5%) were delivered vaginally and 7 cases (17.5%) by Cesarean section. No significantly different results between the both groups regarding the delivery **mode** (p=0.754) as shown in

table (2). This goes with (Abedi-AsI, 2007). In a systematic study of (Crane, 2006) he compared oxytocin with misoprostol in ladies at date with intact membrane and unfavorable cervix, No significantly different results between the both groups regarding rate of CS. In this study, the oxytocin group, 3 cases undergone CS because of distress of the fetus and 5 cases were undergone CS due to induction failure while when using misoprostol, 4 cases undergone CS due to distress of the fetus and 3 cases by CS due to induction failure. No significantly different results between the both groups regarding Cesarean section indication (p= 0.198). This is similar to what have (Zeteroglu, 2009) and (Tan, 2010) found.

**Table 3:** Comparison between the two groups as regards neonatal ICU admission

	Oxytocin		misoprostol		total		P Value
	N	%	N	%	N	%	
Normal	34	85	36	90	70	87.5	0.72
NICU	6	15	4	10	10	12.5	_

The number of neonatal ICU admission was slightly higher when giving oxytocin compared by giving misoprostol [6 cases (15%) and 4 cases (10%) respectively] There was 1 case in the oxytocin group was admitted to neonatal ICU due to thick meconium, 3 cases were admitted due to respiratory depression and 2 cases were admitted due to patent ductus arteriosus & imperforate anus respectively though they was delivered vaginally. There were 2 cases in the misoprostol group admitted to neonatal ICU due to thick meconium and 2 cases was admitted due to respiratory depression. No significantly different results between the both groups regarding neonatal ICU admission (p= 0.718) as shown in the table (3). This goes with (Abedi-Asl, 2007) and (Zeteroglu, 2009)

**Table 4:** Comparing bith groups regarding Apgar score (At 60 seconds and 5 minute)

Apgar score	Oxytocir	Oxytocin		Misoprostol		
	Mean	SD	Mean	SD		
at 60 seconds	6.5	2.1	6.4	1.69	0.42	
at 5 minute	8.92	1.99	8.97	1.52	0.87	

P>0.05 insignificant

No significantly different results between the both groups regarding *Apgar score at 60 seconds*, as the Apgar score was high (little) when giving oxytocin (6.5  $\pm$ 2.1) than that of misoprostol group (6.4  $\pm$  1.69) which denotes homogeneity of 2 groups (p=0.42). No significantly different results between the both groups regarding *Apgar score at five minute*, as the mean was slightly lower in the oxytocin group (8.92  $\pm$ 1.99) than that of misoprostol group (8.97 $\pm$ 1.52) which still denotes homogeneity of 2 groups (p=0.87). These results are similar to (Kulshreshtha, 2007) and (Zeteroglu, 2009)

3 patients when giving oxytocin experienced *uterine hyperstimulation* & 2 of the patients when giving misoprostol experienced uterine hyperstimulation. No significantly different results between the both groups regarding uterine hyperstimulation (p=0.139). This was similar to (Escudero, 1997) and (Zeteroglu, 2009) but in contrast to (Sanchez, 1997), (Hadi, 2000) and (Ramsey, 2005). The lower incidence of hyperstimulation in our misoprostol group is due to lower dose used ( $25\mu g$  vs.  $50\mu g$ ) (Sanchez, 2002).

None of the patients in the oxytocin group experienced *postpartum hemorrhage* while two patients when giving misoprostol had, but no statistical significance for this had obtained. There was no statistically significant difference between the two groups as regards postpartum hemorrhage (p=0.150). (Sanchez, 1997) and (Zeteroglu, 2009) found similar result.

No significantly different results between the both groups regarding *Meconium aspiration* defined as clinical and/or radiographic evidence of respiratory distress associated with meconium in amniotic liquid. This goes with (Hofmeyr, 2010) but opposite to both (Tan, 2010) and (Ayaz, 2010)

#### Conclusions

- 1. The mean of induction delivery period is significantly higher when giving misoprostol than when giving oxytocin.
- 2. No significantly different results between the both groups regarding uterine hyperstimulation.
- 3. No significantly different results between the both groups regarding postpartum hemorrhage.
- 4. No significantly different results between the both groups regarding the mode of delivery.
- 5. No significantly different results between the both groups regarding Cesarean section indication.
- 6. No significantly different results between the both groups regarding Apgar score measurement at 60 seconds and five minutes.
- 7. No significantly different results between the both groups regarding meconium aspiration.
- 8. No significantly different results between the both groups regarding emergency Cesarean section rate due to fetal distress (pathological fetal heart rates) between the two groups.
- 9. No significantly different results between the both groups regarding the neonatal admission to (N.I.C.U)
- 10. Usage of both IV oxytocin 5 mIU/minute & vaginal misoprostol 25  $\mu g$  for safe induction of labor.
- 11. It is preferable to use IV oxytocin 5 mIU/minute if the time factor is considered.

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