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Oxytocin Versus Vaginal Misoprostol for Induction of Labour in Pregnant Women with Term Pre-Labour Rupture of Membranes

Obstetrics & Gynecology

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ABSTRACT

Background: Labor induction means stimulation of the uterine contractions for the production of deliveries before the start of spontaneous labour.

Aim of the work: This study compared the efficacy and safety of vaginal misoprostol against intravenous oxytocin for inducing labour in pregnant women. with term prelabour membrane rupture.

Patients and methods: From July 2021 to February 2022, patients at Al-Hussein University Hospital's Obstetrics and Gynecology Department participated in a randomised controlled trial.

Results: Uterine tachysystole was identified in 7.27 percent of the 55 women who took misoprostol.and (1.81%) had hypersysytole versus (10.90%) had tachysystole and (1.81%) had hyper systole in oxytocin group. There was no statistically significant difference in uterine issues between the misoprostol and oxytocin groups.

Conclusion: Uses of vaginal misoprostol may be an alternative to intravenous oxytocin infusion for induction of labor, with efficacy and safety profile. Vaginal misoprostol was cheap, stable in room temperature, 24 hours, easy to administrate by many women.

Keywords: *Labour induction; oxytocin; misoprostol; uterine hypersysytole.*

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INTRODUCTION

Labor induction means stimulation of the uterine contractions for the production of deliveries before the start of spontaneous labour. The normal childbirth process is categorized into three stages of labor: the shortening and dilatation of the cervix, the descent and delivery of the fetus and placenta. [1]

In obstetric practise, there are numerous indications for induction of labour. The most common indication of which is the prolonged gestational age. It is well understood that induction can be difficult and often unsuccessful with an unripe cervix. In modern practise, It is allowed to use an agent to ripen the cervix prior to induction. 2 Oxytocin and prostaglandins are the most often utilised pharmacological drugs for labour induction. Because of ethical and social concerns concerning misoprostol usage as an abortifacient medicine, the most common form of labour induction is the use of oxytocin. [3]

Misoprostol is more effective than oxytocin in minimising postpartum haemorrhage and inducing labour on time, according to several studies. In the published series, however, misoprostol dosage, administration interval, and administration route were all different. . [4]

Higher doses are linked to an increased risk of uterine hyperactivity, including foetal heart rate fluctuations and other problems.

Despite numerous reports on the subject, the efficacy and safety of oxytocin and misoprostol on mothers and foetuses remain unknown. [5]

A review of the most recent misoprostol research for labour induction has been conducted. In most trials, misoprostol appears to be at least as effective as conventional techniques, the widely varying dosage regimens and small number of women studied do not allow for an adequate assessment of safety [6]. Concerns have been raised about the widespread use of misoprostol in clinical practise, with arbitrary dosages and no registration or proper monitoring for adverse events, as well as reports of complications such as uterine rupture.

Misoprostol administered orally has been shown to be as safe and effective as misoprostol Women

favour vaginal induction of labour since it is administered vaginally. 7

The goal of this study was to compare the efficacy and safety of vaginal misoprostol against intravenous oxytocin for induction of labour in pregnant women with term prelabour membrane rupture.

PATIENTS AND METHODS

This was a randomized controlled trial study conducted at patient at Obstetrics and Gynecology Department of Al-Hussein University Hospital from July 2021 to February 2022.

Sample size: Approximately two groups were randomized to the participating patients, the Misoprostol group "Group I" (n = 55) and the Oxytocin group "Group II" (N = 55). These randomizations were performed using a randomized computer selection and this randomized sel.

By assuming that mean ±SD of interval by hours from induction to vaginal delivery is 16.2 ± 5.1 in misoprostol and 13.2 ± 6 in oxytocin. The sample size is110 (55 in each group) using OPENPI at power 80% and C.I 95 % (127)

Ethical consideration and Study approval: Before beginning the study, The council of Obstetrics and Gynecology Department of Al-Hussein University Hospital, Al-azhar University declared the protocol and other associated documentation for Ethical and Research approval.

Inclusion criteria: Women aged (20-35) years with gestational age (37-41) weeks, singleton pregnancy, presentation of Cephalic, rupture of the membrane "gush of fluid" from amniotic sac and The most reliable approach for confirming ruptured membranes is direct sight of amniotic fluid in the posterior vaginal vault (pooling) (Duff, 2016). Two simple laboratory tests can be used when a physical examination is difficult. (nitrazine paper test and positive fern test)

Exclusion criteria: Contra indication of induction of labor e.g. uterine scar, multiple gestations, IUGR, active herpes infection, oxytocin or misoprostol allergy, pelvic dystocia, foetal weight greater than 4,000 g (Maanosomia) or foetal deformity, signs of cephalopelvic disproportion All included women were being subjected to:Full medical history for evaluating: All women included have been subjected to full medical history for evaluating age, Parity & gravidity, gestational Age according to last menstrual period or U/S, medical and surgical history (DM, HTN, Hepatic, renal and allergy and cardiac) , previous uterine surgery (myomectomy or CS) and previous mode of delivery (VD or CS).

Complete clinical examination: Full Obstetric examination, Abdominal examination: Inspection: Abdominal contour, surgical scars, hernia orifices, umbilical site for discharge or nodules. Palpation: Superficial palpation to detect any tenderness, rigidity, or mass. Auscultation: FHS: can be heard by sonicaid. Local examination: Inspection: for any vaginal bleeding or fluid. Bishop score In this study, the number of participants was kept to a minimum of six. The Bishop Score assigns points to five aspects of the pelvic exam: dilatation, effacement of the cervix, station of the foetus, cervix consistency, and cervix position.

U/S evaluation: Viability of the fetal, expected gestational age, presentation of the fetus, expected fetal body weight, link to the index of amniotic fluids, the Placental site and biophysical Profile including NST will be determined through the U/S evaluation.

Laboratory assessment (Complete blood picture, Liver and renal function test, Coagulation profile, and Fetal evaluation (CTG)) were all performed.

Neonatal Assessment immediately after delivery (APGAR score in the 1st minute, APGAR score in the 5th minute, Fetal birth weight, Head circumference and NICU admission)

Maternal assessment: (Success of VD or emergency CS, Duration (hours) to active phase, Time from induction of labor to delivery and maternal complications as cervical or vaginal tear or Blood transfusion; should be performed to all cases.

Method: Drug prescription method:

The Misoprostol tablet: Women received one tablet of 25 mcg of misoprostol vaginally. Misoprostol was given at a dose of 25mcg/2hour at first, until enough uterine contractions were achieved.

The Oxytocin solution: An IV drip infusion of 2mIU/min (4 drops per minute) was given to women using a syringe pump. Oxytocin in 500 cc of glucose at 5 percent was used to make this. Increases of 2mIU/min were made to the dose every 15 minutes for 3-5 minutes, or until the desired contraction rate of 3-5 every 10 minutes was obtained. Oxytocin is administered at a maximum dose of 36mIU/min until enough uterine contractions are achieved.

Follow up by

Vaginal examination is performed every 2 hours for the assessment of cervical dilation and effacement as well as the condition of intoxication on the partogram. CTG: when CTG results were unsatisfactory (varying excessive or late decelerations), we discontinued induction. Assessment of uterine contractions: A uterine contraction should occur every hour (3-5 every 10 minutes, lasting 40-60 seconds) with the discovery of any abnormalities. Adequate hydration and analgesia was done using crystalloids and narcotics respectively if indicated.

Outcomes: To compare the efficacy of the two medications, the following primary outcomes were used: The induction interval is the time between induction and the early signs of labour (From the time of the first misoprostol solution dose in group I to the time of group II: from the first oxytocin infusion to the commencement of regular uterine contractions) There is a period of time between induction and delivery (starting from the time of first dose of misoprostol solution in Group I and oxytocin infusion in group II till delivery by any route). Secondary outcomes included mode of delivery, uterine hyperactivity, maternal side symptoms

(nausea, vomiting, diarrhoea, shivering, and headache), and newborn outcomes (Apgar score less than 7 at 5 minutes). The success of induction and safe VD were the study's end points. Women in groups I and II who got the indicated treatment, misoprostol in group I and oxytocin in group II, had their primary and secondary outcomes compared.

Statistical analysis: The average plus or minus standard deviation was used to illustrate the data. The statistical software programme SPSS 16.0 was used to conduct the investigation (SPSS Inc, Chicago, IL, USA). To investigate temporal intervals, the Mann-Whitney U test was applied. Use the 2 for qualitative variables and the Student's t-test for quantitative variables. The significance threshold was set at a 0.05 p-value.

RESULTS

This study was conducted at Al-Hussein University Hospital covering the period from the first of July 2021 to the February 2022. A total number of 110 pregnant women at full term were admitted for induction of labor at this period.

The patients were randomly divided into two groups: Group I: Includes 55 patients those patients who had received vaginal misoprostol for induction of labor. Group II: Includes 55patients those patients who received oxytocin infusion for induction of labor

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Age (year) Mean ±SD	25.17± 4.2	25.31± 4.9	0.8695
Gestational age(weeks) Mean ±SD	40±1.2	40±1.3	0.99
Bishop score Mean ±SD	4.62±1.7	4.56±1.5	0.8448
BMI (kg/m2) Mean ±SD	21.61 ±1.6	21.46±1.65	0.6294

Table 1: Demographic characteristics of studied group

Table 1: In terms of mother age, gestational age, bishop score, and BMI, there was no statistically significant difference between the two groups.

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Induction to onset of active phase(hours) Mean ±SD	10.6±6.1	12.9±5.4	0.0387*
Induction to vaginal delivery (hours) Mean ±SD	13.4±6.5	15.8±5.9	0.0451*

Table 2: induction time

Table 2: Both the mean time from induction to active phase and the mean time from induction to delivery were considerably shorter in the misoprostol group than in the oxytocin group (10.6 and 13.4 hours against 12.9 and 15.8) hours, with p-values of 0.05, which are statistically significant.

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Vaginal delivery N (%)	47(85.45%)	45(81.82%)	**0.606**
Cesarean section N (%)	8(14.55%)	10(18.18%)	

Table 3: Mode of delivery

Table 3: in misoprostol group successful VD was at a higher rate than oxytocin group and C.S was lower than oxytocin group but this difference was not statically significant. , The chi-square statistic is 0.2657. The p-value is .606231. The result is not significant

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Tachysystole N (%)	5 (9.09%)	7(12.73%)	**.540751**
Hypersysytole N (%)	1 (1.81%)	1 (1.81%)	**1(.99999)**
Hyper stimulation syndrome	-	-	-

Table 4: uterine hyperactivity

Table 4: it was found that out of 55 women with misoprostol group (7.27%) had uterine tachysystole and (1.81%) had hypersysytole versus (10.90%) had tachysystole and (1.81%) had hyper systole in oxytocin group. There was no statistically significant difference in uterine complications in misoprostol group and oxytocin group.

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Shivering N (%)	8(14.54%)	9(16.36%)	.791955
Nausea N (%)	6(10.9%)	5(9.09%)	.750621
Vomiting N (%)	5(9.09%)	2(3.63%)	.241281
Atonic Post-partum hemorrhage N (%)	2(3.63%)	6(10.9%)	.141934
Blood transfusion N (%)	1(1.81%)	3(5.45%)	.308349

Table 5: maternal side effects

Table 5: no significant difference found between the 2 groups in terms of maternal side effect. The common maternal side effect was shivering its incidence in both group (14.54%, 16.36%) also nausea (10.9%) in misoprostol group and oxytocin group (9.099%) respectively. Postpartum hemorrhage is found more than in oxytocin group but without significance difference

	Studied groups		p
	Misoprostol (n=55)	Oxytocin (n=55)	
Apgar score 1st/min<7 N (%)	5(9.09%)	3(5.45%)	.462758
Apgar score5th/min<7 N (%)	2(3.6%3)	4(7.27%)	.401066
NICU N (%)	1(1.81%)	5(9.09%)	.093067
Birth weight Mean ±SD	3125±220	3105±350	0.5032

Table 6: Neonatal outcome

Table 6: When the infant outcomes in this trial were analysed, the misoprostol group was found to have a decreased incidence of Apgar scores at 5 minutes less than 7 at the end. between two group showing closure safety in neonates but without significance differences. NICU admission was found less in misoprostol group comparable to oxytocin group but without significance differences.

DISCUSSION

Labor induction is one of the most commonly used procedures for delivering mothers all over the world. Women may be upset if labour does not begin on the expected date, and obstetricians must deal with this stress. When the benefits of delivery to the mother and/or the foetus outweigh the risks of carrying the pregnancy to term, induction of labour is recommended. [8]

We planned to use small doses of misoprostol at regular intervals to determine the induction-delivery interval, rate of vaginal delivery, and neonatal outcome, taking advantage of the drug's short half-life. 9

A "randomised clinical trial" was conducted at Al-Hussein University Hospital to investigate the efficacy and safety of titrated vaginal misoprostol solution against intravenously oxytocin for labour induction. This study involved 110 pregnant women who were scheduled for birth at Al-Hussein University Hospital. from July 2021 to February 2022. They were randomly distributed divided in two groups, misoprostol "Group I" (n = 55), oxytocin "Group II" (N = 55).The findings of this study revealed no statistical differences in demographic parameters between the two groups studied. Maternal age (years) Nullipara was approximately 36.36 percent in the misoprostol group and 38.18 percent in the oxytocin group, with ages ranging from 20 to 35 years, gestational age (weeks) ranging from 37 to 41 weeks, and nullipara being approximately 36.36 percent in the misoprostol group and 38.18 percent in the oxytocin group. In the misoprostol group, multipara was around 63.64 percent, while in the oxytocin group, it was around 61.8 percent. The time from induction to the commencement of the active phase of labour (hours) was determined to be 10.66.1 in the misoprostol group, compared to 12.95.4 in the oxytocin group in the current study.

also induction to delivery time was shorter in misoprostol group than oxytocin group 13.4±6.5 and 15.8±5.9 respectively which is statically significant.

The result agree by de Aquino and Cecatti, [10] conducted a randomised controlled clinical trial in 210 pregnant women using vaginal misoprostol to induce labour. Misoprostol was given to 105 people, and oxytocin was given to 105 people. The average duration between the commencement of labour and According to the study, the misoprostol group had a significantly lower rate of vaginal birth. The misoprostol group required 10.64.4 minutes while the

oxytocin group took 14.85.1 minutes to induce vaginal delivery. Misoprostol (50 g, single dose, vaginally) and oxytocin (2 to 32 mU/min) were also studied by Campos et al., 11. The misoprostol group had an average of 552 minutes until labour started, compared to 745 minutes for the oxytocin group, indicating statistical significance. Our conclusions are supported by these findings. In addition to, Sanchez-Ramos et al., [12] Researchers compared the safety and efficacy of intravaginal misoprostol (50 mg at four-hour intervals) to intravenous (IV) oxytocin infusion for labour induction. The average duration between misoprostol and oxytocin till vaginal birth was similarly shorter for misoprostol (11 versus 18 hours), which was statistically significant. For cervical softening and induction, The findings of oral misoprostol (50 g po q4h prn), low-dose vaginal misoprostol, and the standard dinoprostone vaginal gel approach were not statistically significant. Clinicians can select induction drugs depending on cost, local logistics, and patient desire. [13]

Umar Hauwa et al., [14] conducted a randomised control trial between oral and vaginal misoprostol involved in 169 women for induction of labour. There were 85 women 84 women were given vaginal misoprostol and 84 women were given oral misoprostol.

With more vaginal deliveries, the oral group had a significantly shorter induction-delivery interval (18.48 +/- 2.01 vs. 22.82 +/- 2.50). (85.7 percent vs. 88.2%) compared to the vaginal group. The vaginal group had considerably more cardiotocographic anomalies than the oral group (8.3 percent vs. 1.2 percent, P = 0.03). The vaginal group had higher foetal discomfort and meconium tinged liquor, although this was not statistically significant. Also, Hall et al., [15] To induce labour, researchers compared the effects of oral misoprostol against vaginal misoprostol.

A total of 107 women took part (Fifty-nine women received oral misoprostol, and 48 received vaginal administration). The findings revealed that the vaginal and oral arms had identical delivery times (1074 488 minutes versus 930 454 minutes). The vaginal and oral groups have considerably varied parities. The vaginal and oral arms had equal rates of caesarean deliveries (17 percent versus 15 percent). The vaginal and oral arms had equal rates of caesarean deliveries (17 percent versus 15 percent). The oral and vaginal groups had similar chorioamnionitis and tachysystole.

There was no statistical difference between the groups. Furthermore, Asokan et al., [16] conducted a comparative study of titrated oral misoprostol solution and oxytocin to induce labour in 280 term pregnancies. Induction-to-delivery time and induction to active labour were both shorter in the misoprostol group (10.16.1 and 13.27.7, respectively) than in the oxytocin group (12.95.4 and 15.65.1).

A randomised control trial was also conducted in the department of Gynecology and Obstetrics in Pakistan (Umbreen Idrees et al., [17]. A total of 760 (two groups of 380 each). In the misoprostol and oxytocin groups, the mean (SD) induction to delivery interval was 293.8299.36 minutes and 311.65106.73 minutes, respectively.

On the other hand, Aalami-Harandi et al.[18] In a randomised clinical research, 285 pregnant ladies in their third trimester who were vaginal birth prospects

They were divided into two groups at random based on the treatment approach used, misoprostol or oxytocin. In the oxytocin group, the mean time intervals from induction to active phase and labour were considerably shorter than in the misoprostol group (10.1 and 13.2 hours versus 12.9 and 15.6 hours, respectively). A total of 74 women were examined retrospectively for various induction procedures 19. Misoprostol alone or for cervical ripening, oxytocin plus amniotomy, and a trans cervical Foley catheter were among the induction treatments used. 88 percent of patients were delivered within 24 hours on average. with a delivery time of 11 hours and 20 minutes on average. The group receiving oxytocin and amniotomy had the smallest median interval (7 hours 44 minutes). These result were agreed by de Aquino and Cecatti , [10] 81 % of women included in vaginal misoprostol group have VD and 19 %have CS and 64 %women in oxytocin group have VD and36%have CS but without significance difference

These outcomes were agreed upon by Antil et al., [20] 85.19 % of women in the misoprostol group have VD and 11.11 % have CS, while 78.85 % of women in the oxytocin group have VD and 17.31 % have CS, with no statistically significant difference.

According to Aalami-Harandi et al., [13] During the study period, the misoprostol group had a considerably greater rate of vaginal births at 18 and 24 hour intervals than the oxytocin group. (67.1, 79.7 % versus 53.1, and 61.7 %). In the current study, Tachysystole was found about 9.09 % in misoprostol group and 12.73% in oxytocin group, Hypersysytole1.81%the same in both groups.

These outcomes were agreed upon by Antil et al., [20] there was a lower incidence of uterine hyperactivity (1.85 percent) in the misoprostol group compared to the oxytocin group (5.77 percent), but it was not statistically significant.

Also Deshmukh et al .[21] In a prospective observational study of oral misoprostol solution for induction of labour, 200 patients were randomly selected for induction with the drug. The incidence of tachysystole was only 3 %these result showing safety of misoprostol in low doses.Also Ho et al., [22] Tachysystole was experienced by 7 women (5.9%) in the titrated oral misoprostol group and 17 women (15.0%) in the titrated intravenous oxytocin group, while uterine hyperstimulation was experienced by one woman (0.8%) in the titrated oral misoprostol group and two women (1.8%) in the titrated intravenous oxytocin group. Also, Asokan et al., [16] found a higher rate of tachysystole in the misoprostol group compared to the oxytocin group (12.9 percent vs. 8.5 percent), but no statistically significant differences.When compared to oxytocin, misoprostol use was shown to be related with an insignificantly

greater incidence of vomiting and nausea effects in the current investigation. There was also a higher rate of post-partum haemorrhage 10.9% in the oxytocin group, compared to 3.63 % in the misoprostol group, and blood transfusion. 5.45% in the oxytocin group and 1.81 % in the misoprostol group, but there was no statistically significant difference.

Misoprostol use was also found to be associated with an insignificantly lower rate of incidence. 5th/min7 Apgar score around 3.63 percent compared to 7.27 percent in the oxytocin group, and NICU admission was 1.81 percent in the misoprostol group compared to 9.09 percent in the oxytocin group. In both groups, there was no maternal or foetal death.

These findings were consistent with those of Asokan et al., [16], who discovered a lower rate of post-partum haemorrhage in the misoprostol group compared to the oxytocin group (7.1 percent and 12.1 percent, respectively), as well as a higher rate of GIT symptoms in the misoprostol group compared to the oxytocin group (9.3 percent and3.6 percent, respectively). The incidence of Apgar score at 5th/min7 was the same in both groups1 percent.

Also the result matched by Antil et al., [20] that tachysystole in misoprostol group 1.85 %and in oxytocin group 3.85 % and GIT symptoms more in misoprostol group but without significance differences, incidence of Apgar score at 5th/min<7 where 7.6% in oxytocin group only.

The current study's and similar studies' significant low incidence of neonatal outcome (low Apgar sore at 1&5 minute and lower admission to neonatal ICU) could be explained by low doses of misoprostol and or oxytocin due to titration methods used maintaining their high efficacy with reduction in neonatal complications.

CONCLUSION

Uses of vaginal misoprostol may be an alternative to intravenous oxytocin infusion for induction of labor, with efficacy and safety profile. Vaginal misoprostol was cheap, stable in room temperature, 24 hours, easy to administrate by many women.

Conflict of interest : none

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