Original Article

The Effect of Metoclopramide on the Length of First Stage of Labor and on Labor Pain in Nulliparous Women, A Randomized Controlled Trial

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ABSTRACT

Background: Prolonged labor can lead to increased maternal and neonatal morbidity and mortality. The two main factors that determine duration of labor are cervical dilatation and effacement . Several studies showed that active management of labor could shorten the duration of labor through mechanical, pharmacological and non-pharmacological factors that can increase cervical dilatation. Metoclopramide could reduce spasms of the smooth muscle of the cervix , has a regulatory effect on cervical contractility and promoting cervical dilatation during labor.

Objective: To determine whether Metoclopramide shortens the active phase of first stage of labor in Nulliparous women at term and reduces pain during this stage or not.

Subject and Methods: A controlled, clinical trial between March 2022 to July 2022 was conducted, including a total of 100 pregnant women in active labor , they were randomly assigned into 2 groups; 50 women received an intravenous injection of 10 mg metoclopramide (Group 1) and 50 women received the same volume of placebo (0.9% sodium chloride) (Group 2).

Results:

Regarding the duration of second stage of labor, the difference was not statistically significant (*p-value* > 0.001). On the other hand, there was significant difference regarding duration of active phase of first stage of labor (*p-value* < 0.001). The mean duration of active phase in group 1 was (145.8 minutes) compared to (263.6minutes) in group 2, the duration from admission until full cervical dilatation was shortened by 117.8 minutes. The rate of cervical dilatation was significantly higher in group 1 compared to group 2 (P- value < 0.001). The mean rate of cervical dilatation was 2.03 (cm/h) in group1 compared to 1.1(cm/h) in group 2. 19/50 (38%) women of group 1 needed oxytocin augmentation, while 35/50 (70%) women of group 2 needed oxytocin augmentation , which was highly statistically significant (*P-value* <0.001). Regarding labor pain score using baseline visual analogue scale (VAS) and at 30, 60 and 120 minutes, the differences between both groups were not statistically significant (*P-value* >0.001).

Conclusion: This study showed that IV injection of Metoclopramide 10 mg every 2 hrs for a maximum of three doses help in reducing duration of active phase of first stage of labor with reducing the use of oxytocin in augmentation of labor.

Key Words: Labor duration, labor pain, metoclopramide.

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INTRODUCTION

Labor duration is one of the effective factors in maternal and fetal outcomes[1].

Prolonged labor can increase the risk of maternal and neonatal morbidity and mortality such as rupture of the uterus, postpartum hemorrhage, puerperal sepsis, maternal and fetal death[2].

The mean duration of the first and second stages of labor is approximately 9 in nulliparous and 6 hours in multiparous women. So, cervical dilatation ranges from 1.2 up to 6.8cm/hr. Prolonged labour is considered if the total duration of labor is more than 20 h in nulliparous or more than 14 h in multiparous[3].

Metoclopramide could reduce spasms of the smooth muscle of the cervix and has a regulatory effect on cervical contractility, which is important in helping maximal tissue compliance, promoting cervical dilatation during labor[4].

The aim of this research is to assess if metoclopramide is helpful in reducing the duration and pain of spontaneous labor among nulliparous women or not.

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SUBJECTS AND METHODS

One hundred pregnant women presenting at the Obstetrics and Gynecology emergency department at Cairo University hospitals in active labor were divided into 2 equal groups. They were randomly divided into 2 groups, (Group 1) received an intravenous injection of 10 mg metoclopramide , (Group 2) received the same volume of placebo, which was 0.9% sodium chloride

Clinical trial registration: NCT04969120.

The study started from August 2021 to –January 2022.

All patients were subjected to the following:

Informed consent, Full history taking, Obstetric palpation (Leopold'sManeuvers), Routine ultrasound examination, Vaginal examination was done to evaluate cervical dilatation, effacement and position, presenting part, position of fetal head ,state of fetal membranes, and adequacy of pelvis.

The admission of women was done when active phase of labor started, which include the presence of at least three regular uterine contractions over 10 minutes with cervical dilatation of four centimeters and cervical effacement of at least 50%. Group 1 received an intravenous injection of 10 mg Metoclopramide over 2 min and it was repeated every two hours for a maximum of three doses.

Group 2 received 10 mg of placebo, i.e.0.9% sodium chloride which was also repeated in the same way.

Monitoring of labour was done , and vaginal examination was done every two hours. The time of cervical dilatation from four centimeters in active labor until reaching a fully dilated cervix was observed ,thus the duration of the first stage was calculated .

The patients were included in the study according to the following inclusion and exclusion criteria.

Inclusion criteria

Nulliparous women, Single fetus, Term pregnancy (37-42 weeks), Cephalic Vertex presentation, occipito anterior position, Regular uterine contractions at every 5 minutes, each lasting for 20 seconds, Cervical dilatation of 5cm,with or without the membranes were ruptured, No evidence of fetal or maternal distress

Exclusion criteria

Cephalopelvic disproportion, Chorioamnionitis, prior uterine surgery (e.g. repaired rupture uterus, myomectomy), History of cervical trauma, Hypersensitivity to metoclopramide.

Randomization and allocation

Randomization was achieved using computer generated randomization sequences. Allocation was in 1:1 ratio.

Two groups were generated: (Group 1): 50 patients received an intravenous injection of 10 mg metoclopramide, (Group 2):50 patients received 10 mg of placebo, i.e.0.9% sodium chloride).

Outcome measurement

The primary outcome was cervical dilatation rate. The secondary outcomes included duration of the second stage of labor, number of participants with adverse events, labor pain score using visual analogue scale.

Sample size calculations

The sample size was determined according to the primary outcome variable which was the cervical dilation rate. According to the literature[5], it was reported that the cervical dilatation rate was (2.4 ± 0.4 cm/hr among those who received metoclopramide versus 1.9 ± 0.5 cm/h in the placebo group, P<0.001).

These values were applied in the calculation of sample size using the formula for comparison of means. Type II error margin for this study was set at 0.05, implying a power of 95%. A minimum difference in mean rate of cervical dilation of 0.5 cm/hr was assumed, for the effect to be attributable to the metoclopramide administered. Participants are to be recruited for the study (40 subjects in each group).

Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Medicine. Cairo University. All patients enrolled in the study had an informed written consent after explanation of the purpose and benefits of study with assurance of Autonomy and confidentiality.

RESULTS

Patients recruited to the study according to the inclusion and exclusion criteria were 100 pregnant women who presented to our emergency department, and were further subdivided into two groups as shown in (Figure 1).

Group 1: included 50 patients who received Metoclopramide.

Group 2: included 50 patients who received normal saline (control).

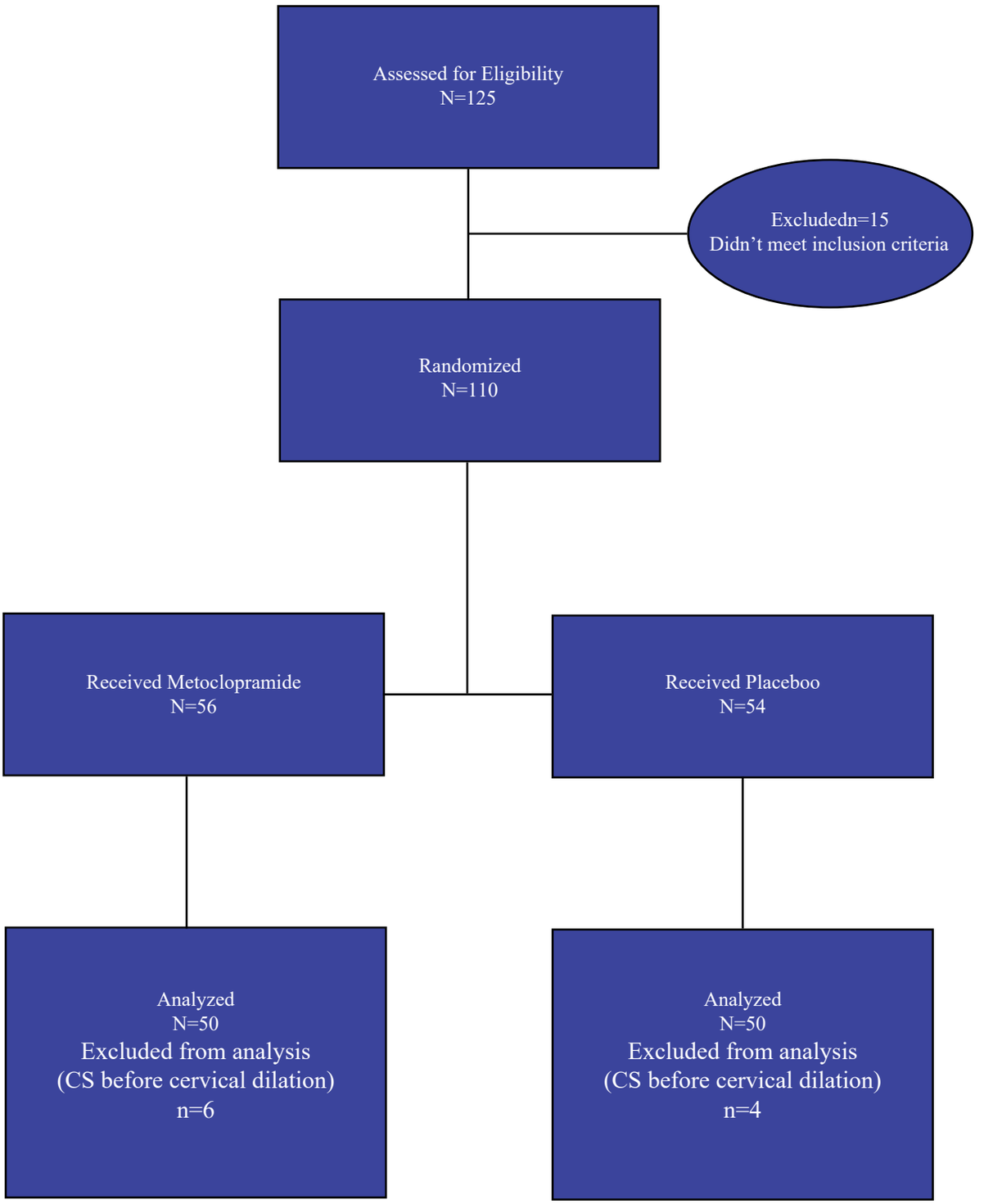

Fig. 1: Showing the distribution of the patients included in the study

N.B. Indications for CS in group 1 included arrest of descent (n=4) and fetal distress (n=2) and indications for CS in the group 2 also included arrest of descent (n=2), and arrest of dilatation (n=2)

There were no statistically significant differences regarding maternal age and gestational age between both groups as shown in (Table 1).

Regarding the duration of second stage of labor, there was no statistically significant difference between both groups. On the other hand, there was significant difference regarding duration of active phase duration (*p-value* <0.001) as shown in (Table 2).

Regarding the rate of cervical dilatation, there was statistically significant difference (*P-value* < 0.001) between both groups as it was significantly higher in group 1 in comparison with group 2 as shown in (Table 3).

There was a highly statistically significant difference between both groups regarding the need for augmentation of labor by oxytocin which was more in the control group (group 2) (*P-value* <0.001) as shown in (Table 4).

Regarding labor pain using VAS, there were no statistically significant differences between both groups as shown in (Table 5).

Table 1: Distribution of Age group, gestational age

	Group 1					Group 2					*P value*
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
Age (year)	21.00	3.23	20.5	17.00	32.00	22.7	3.77	22.00	16.00	30.00	0.460
gestational age (weeks)	38.60	1.16	39.00	37.00	41.00	38.78	1.16	39.00	37.00	41.00	0.531

Table 2: Mean active phase duration and second stage duration among the patients

	Group 1					Group 2					*P value*
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
Active phase duration (min)	145.80	28.86	125.00	120.00	180.00	263.60	55.94	300.00	180.00	320.00	<0.001
2nd stage duration (min)	63.70	12.07	60.00	45.00	95.00	71.10	14.08	70.00	50.00	95.00	0.076

Table 3: Rates of cervical dilatation among the patients included in the study

	Group 1					Group 2					*P value*
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
Rate of cervical dilatation(cm/h)	2.03	0.40	2.00	1.50	2.67	1.10	0.10	1.10	1.00	1.30	<0.001

Table 4: Comparison between both groups regarding the use of oxytocin for augmentation

	Group No.=50		Group 2 No.=50		*P value*
	Number	Percentage	Number	Percentage	
Oxytocin augmentation	19	38%	35	70%	< 0.001*

*Chi square test

Table 5: Labor pain score in both groups using baseline visual analogue scale (VAS) and at 30,60 and 120 minutes

	Group 1			Group 2			*P value*
	Median	Minimum	Maximum	Median	Minimum	Maximum	
BaselineVAS	4	4	5	4	4	5	0.774
VAS 30 min	5	4	6	5	5	6	0.838
VAS 60 min	5	5	6	6	6	7	0.656
VAS 120 min	6	5	7	7	6	7	0.585

DISCUSSION

Approximately 8% of all women giving birth are affected by a prolonged labor, and the complication occurs three times more often among nulliparous women than among multiparous women in Western countries[6].

In this RCT, we assessed the effectiveness of metoclopramide in the reduction of the duration of the first stage of labor in nulliparous women and its effect on labor pain by VAS.

The mean duration of active phase in group 1 was (145.8 minutes) compared to (263.6minutes) in group 2, the duration from admission until full cervical dilatation was shortened by117.8 minutes. There was no statistically significant difference regarding duration of second stage of labor. While, there was significant difference regarding duration of active phase duration (*p-value* < 0.001). The rate of cervical dilatation was significantly higher in group 1 compared to group 2 (*P- value* < 0.001). The mean rate of cervical dilatation was 2.03 (cm/h) in group 1 compared to1.1(cm/h) in group 2.

There was a study showing similar results 5, as the mean duration from admission until full cervical dilatation was 203 min in the study group compared with 230 min in the control group. The mean cervical dilatation rate was 2.4 ± 0.4 cm/h in the study group and 1.9 ± 0.5 cm/h in the control group.

Also another study[7], showed the mean duration from admission until full cervical dilatation was 126 ± 35.4 min in the study group and186 ± 46.8 min in the control group, with a difference of 40 minutes in the study group. The mean cervical dilatation rate was 1.9 ± 0.59 cm/h in the study group and 0.98 ± 0.55 cm/h in the control group.

There were no statistically significant differences between both groups regarding labor pain using VAS.

The results agree with study[5] by Ellaithy etal., 2019, also there were no statistically significant differences between both groups regarding labor pain using VAS.

Regarding need for use of oxytocin for labor augmentation; Our results showed highly statistically significant difference between both groups regarding the need for augmentation of labor by oxytocin (*P-value* >0.001). where oxytocin was more needed in group 2 than in group 1.

The results disagree with the study5 by Ellaithy *et al*., 2019, No significant result were noted regarding the need for oxytocin for labor augmentation.

The results agree with the study7 by Edessy *et al*., 2015, which showed highly statistically significant difference between both groups regarding the need for more doses of augmentation by oxytocin (*P-value*>0.001). Where oxytocin was significantly needed more in the control group than in the metoclopramide group.

CONCLUSION

Regarding efficacy, outcome, duration of active phase of first stage of labor, cervical dilatation rate (cm/h) and need for oxytocin in augmentation of labor, Metoclopramide is preferable in management of prolonged labor in primiparous women and it is safe on fetal and maternal health. But, the effect of metoclopramide on labor pain was insignificant.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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