The effects of Pethidine on the duration of active labor in nulliparous women

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Abstract

Introduction: Prolonged labor can lead to maternal and neonatal complications. The purpose of this study was to investigate the effect of Pethidine on the duration of active labor in nulli-parous women.
Materials and methods: In a randomized clinical research 90 nulliparous women with uncomplicated singleton pregnancies at term were randomly assigned into two groups. The first group received 50 mg Pethidine IM and the second group received an equal volume Normal Saline IV as Placebo throughout active labor.
Results: Affecting variables on labor outcomes were similar in two groups. The differences in the duration of the active phase of the first stage of labor were significant between groups (230.62 ± 31.19 min in the Pethidine group *vs* 247.73 ± 37.94 min in Normal Saline group; P=0.038). Apgar scores at 1 and 5 minutes were similar in two groups; P=0.203).
Conclusion: This study showed that Pethidine is an effective agent in the labor duration and significantly decreased the duration of active phase of labor in nulli-parous women.

Keywords: Active phase, nulli-parous women, prolonged labor

Introduction

Labor is defined as uterine smooth muscle contractions resulting in progressive cervical dilation and effacement accompanied by the descent and expulsion of the fetus (1, 2). Prolonged labor has side effects on mothers and infants (2).
There are several pharmacological methods for reduction of labor duration, including; Oxytocin (3, 4), over hydration (5-7), Propranolol (8-10), Epidural regional analgesia (11) and Nitrous oxide (12, 13).
Pethidine, Meptazinol and piritramide are the most common opioid used in parturient during labor (11). Pethidine or Meperidine hydrochloride is the first synthetic opioid synthesized in 1932. A previous study reported that intramuscular Pethidine analgesia during the first stage of labor hasn't significance side effect (14). However, Pethidine and Tramadol have

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similar effects on labor duration, but also it is established that Pethidine is a better choice than Tramadol in patients with obstetric analgesia (15). Pethidine can reduce the duration of active labor in nulli-parous women with normal pregnancy and term gestational age (16). However, in contrast, another study reported that Pethidine caused the slower labor (17). A randomized clinical trial indicated that both Meperidine and control groups have an equal duration of labor. The pH of the umbilical cord arterial was lower in the Meperidine group in comparison with the control group; although the difference was not statistically significant (18).

The present study was carried out to examine the effects of IM Pethidine on the labor duration in nulli-parous women.

Materials and methods

A randomized clinical trial was conducted from December 2012 to March 2014. The trial was approved by the Ilam University of Medical Sciences Institutional Ethics Committee, and informed consent was obtained from all participants. Using Epi Info version 3.5.1 (Centers for Disease Control and Prevention, Atlanta, GA, USA) and StatCalc version 1.0.1 (AcaStat, Leesburg, VA, USA), a sample size of 90 participants was determined to have 80% power to detect significant differences between the study groups for a confidence interval of 95%.

The eligibility criteria were nulli-parity, age between 18 and 35 years, singleton pregnancy, spontaneous active labor, cervical dilation between 4 and 5 cm, gestational age between 38 and 40 weeks, normal fetal heart rate tracings, intact membranes, and vertex presentation. The exclusion criteria were elective labor induction, emergency cesarean delivery, known cephalopelvic disproportion, diagnosed Pre eclampsia, chorioamnionitis, pyelonephritis, maternal cardiac, renal disease, intrauterine growth restriction and cervical dilation greater than 5 cm .

Women were randomly assigned to Pethidine and Normal Saline group as they presented in labor. Randomization was carried out in the obstetric triage unit using a random-number chart. The Pethidine group received 50 mg Pethidine IM. Those in the Normal Saline group received an equal volume Normal Saline IV .

Amniotomy was performed by a trained midwife when cervical dilation reached 5 cm if the membranes had not ruptured spontaneously. The main outcome data (duration of the active phase of the first stage of labor and Apgar scores at 1 and 5 minutes were recorded prospectively by a trained midwife on the paper form. To allow for comparisons of labor durations among the two groups, a cervical dilatation of 4 to 5 cm was considered to signal the onset of the active phase of labor .

All collected data were analyzed using SPSS version 16 (IBM, Armonk, NY, USA). Comparisons of means were done by t-test and comparison of proportions by the χ^2 test. P=0.05 was considered significant.

Results

None of the 90 enrolled women withdrew for any reason. Key variables known to affect labor outcomes, such as maternal age and weight, cervical dilation, and station of the fetus, were similar between two groups (P > 0.05). Participants' characteristics are presented in Table 1. The duration of the active phase of labor were 14 min shorter in the Pethidine group. (230.62 ± 31.19 min in the Pethidine group *vs* 247.73 ±37. 94 min in Normal Saline group). This difference was statistically significant (P=0.038).

However the frequency of cesarean section deliveries decreased in the Pethidine group compared to the Normal Saline group, but there were no significant differences in the type of delivery between two groups (P=0.292). The results are presented in Tables 2.

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Table 1. Comparison of participants' characteristics between two groups.

Characteristic	Mean±SD (n=45)		P- value
	Pethidine	Normal Saline	
Maternal age (years)	25.62 ± 4.74	25.69 ± 4.53	0.946
Gestational age (days)	39.8± 0.9	39.1± 0.02	0.615
BMI (kg/m2)	23.04 ±1.93	22.89 ± 2.01	0.709
Birth weight (g)	3183.33 ±337.94	3247.78 ± 363.1	0.386

SD, standard deviations; BMI, body mass index

Table 2. Comparison of the type of delivery in the two groups.

Characteristic	*n*=45				*P*- value
	Pethidine		Normal Saline		
Normal vaginal delivery	38	(84.4)	34	(75.6)	0.292
Cesarean section delivery	7	15.6	11	(24.4)	0.292

No significant differences in neonatal outcomes such as Apgar scores at 1 and 5 min (P=0.203) and the need for admission to the neonatal intensive care unit (NICU) were found between two groups.

Discussion

In recent years the investigation of new methods to reduce prolonged labor and prevent cesarean section has been requested in obstetric practice. Intramuscular opioids are one form of analgesia regularly employed in labor (19). Therefore, the present study aimed to investigate the effect of Pethidine on the duration of active labor in nulli-parous women .

Our results showed that Pethidine could significantly shorten the duration of active phase of labor. Recently a prospective randomized controlled trial evaluated the efficacy and adverse effects of Diamorphine and Pethidine in laboring women. Overall 484 women were participating in the study (244 Diamorphine, 240 Pethidine). The results shown that average length of labor in women receiving Ddiamorphine was 82 min longer (95% CI: 39-124) in comparison the Pethidine group (20).

A randomized controlled trial compared the efficacy of Fentanyl administered via the subcutaneous (n = 53), intra-nasal (n = 52), and intramuscular Pethidine (n = 51) in laboring women. Based the results of this study, the Fentanyl administered by s.c. and i.n. routes are as efficacious in relieving labor pain as i.m. Pethidine, but resulted in shorter labor and fewer difficulties in establishing breast feeding (21).

In an Iranian single-blinded, randomized controlled trial, participated 80 primi-gravid singleton women with full-term pregnancy candidate for normal vaginal delivery. Participants were divided into two groups, the Pethidine and Paracetamol groups. Participants in Pethidine group received 50 mg intramuscular Pethidine injection. At the same time participants in Paracetamol group, received an intravenous solution infusion containing 1000 mg Paracetamol and 300 cc of Normal Saline. The results of the study indicated that labor duration had no

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meaningful difference between two groups (P>0.05) (19).

Based our results, there wasn't significant differences in neonatal outcome between two groups. Another study confirms our results and reported that Apgar score of neonates was above 8/10 in primi-gravid women who received Pethidine in active phase of labor (19).

Conclusion

Pethidine is an effective agent in the labor duration and significantly decreased the duration of active phase of labor in nulli-parous women. Therefore, we suggest the use of IM Pethidine in nulli-parous singleton women candidate for normal vaginal delivery .

Conflict of interest

The authors declare that they have no conflict of interest.

Acknowledgment

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