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Effect of Entonox gas on severity of labor pain in primiparous mothers: A randomized controlled trial

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ABSTRACT

Introduction: Labor pain is an inevitable and common phenomenon whose intensity is ranked highest among pain scores in humans. Reducing labor pain can encourage the women to accept vaginal delivery. The aim of the present study is to determine the effect of Entonox gas on severity of labor pain. *Materials and methods:* The present study is a clinical trial conducted after receiving the ethical code from Ilam University of Medical Science (REC.1394.24.IR.IUMS). 78 primiparous women were included in the study by random allocation method. Test group (N=38) received Entonox gas during labor while the control group (N=40) had no intervention. The

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research tool was demographic questionnaire and visual analog scale. After data collection, the data were analyzed by analytical and descriptive statistics using SPSS Version 16 software. *Result:* The results showed that Entonox gas reduced the pain of the patients in the experimental group and before the intervention in the test group, the mean (SD) pain was 7.26 (0.55), which after intervention reached 2.44 (0.64). Which was statistically significant ($p<0.001$). *Conclusion:* Entonox gas caused a reduction in the pain of mothers during labor. Thus this intervention can be applied as an intervention capable of reducing the pain in mothers.

Keywords: Entonox gas; Pain; Labor

1. INTRODUCTION

Labor is a physiological and psychological phenomenon as old as the human history. In the era of technology, women are continuously exposed to the messages which damage their ability and beliefs about natural labor (Pascali-Bonaro & Kroeger, 2004; Sehati Shafaei, Kazemi, & Ghojazadeh, 2013). In fact, labor and birth of an infant is one of the holiest and most magnificent moments of life as well as one of the most stressful and painful phenomena. This stress can be intensified by hospitalization of the mother and her encounters with strangers which would result in a feeling of loneliness (Bahri N, 2004; Honarmandpour & Yaralizadeh, 2017).

Labor pain is a common and inevitable phenomenon which is among the most severe pains of human being (Carvalho & Cohen, 2013; Janssen, Shroff, & Jaspar, 2012). Labor pain reduction is one of the ways to encourage women to do vaginal delivery (Cunningham, Leveno, Bloom, Spong, & Dashe, 2014). Labor pain may cause stress in the mother and affect different systems in her body; hence reduction of labor pain can be a natural solution (Ali & Ahmed, 2018; Moghimi Hanjani et al., 2018; Yildirim, Alan, & Gokyildiz, 2018). Numerous studies have addressed reduction of labor pain and different interventions have been investigated among which change in position and back massage(Ali & Ahmed, 2018), aromatherapy (Tanvisut, Traisrisilp, & Tongsong, 2018), culture-based chants (Ghose), reflexology, massage (Hu, Brettle, Jiang, & Zeng, 2018; Smith et al., 2018) and Entonox (Parsa, Saeedzadeh, Roshanaei, Shobeiri, & Hakemzadeh, 2017; Sheyklo et al., 2017) can be mentioned.

Entonox is a pain reliever inhaling gas comprised of oxygen and nitrous oxide which can play a significant role in pain relief (Jafarzadeh, Shabanian, & Jafari, 2012). On the other hand, as Entonox is self-administrated, its rate and time of consumption rests with the mother (Rosen, 2002). Its simplicity and safety, fast effectiveness, anti-pain and anti-anxiety effects, possibility of control by the patient, ease of use and short half-life are among the advantages of Entonox (Emmanouil & Quock, 2007; Honarmandpour & Yaralizadeh, 2017; Reynolds, 2010).

Regarding the significance of this problem and as no study has been conducted on the effect of Entonox gas on severity of labor pain, the current study was conducted.

2. MATERIALS AND METHODS

The current clinical trial was conducted after attaining permission from the ethical committee of Ilam University of Medical Science (REC.1394.24.IR.IUMS). 78 primiparous women referring to Shahid Mostafa Khomeini Hospital of Ilam (as the only public gynaecology center of Ilam) entered the study and were randomly allocated in two groups: the test group (N=40) who received Entonox gas during labor and the control group (N=40) who had no intervention. It should be noted that at first, 40 patients were enrolled in each of the groups. Two of the patients in the experimental group were excluded from the study because of their unwillingness to continue participating in the study.

Inclusion criteria were being primiparous, in week 39-42 of pregnancy (according to ultrasonography in first three weeks of pregnancy or LMP date), singleton pregnancy, age of 18-35, low-risk pregnancy and IBM of 19.8-30 in the first three months of pregnancy. Exclusion criteria included cardiovascular diseases, liver, renal and digestion disease, diabetes, twin pregnancy, placenta previa, small pelvis, sensitivity to topical anesthetics, discontinuation in active phase of labor and elongated labor.

In this study, research tools included demographic questionnaire and Visual analog scale (Eilami, Moslemirad, Naimi, Babuei, & Rezaei, 2018; Gallagher, Bijur, Latimer, & Silver, 2002; Johnson, 2005). After acquiring the required approval from Ilam University of Medical Sciences and the head of Shahid Mostafa Khomeini Hospital, the researcher started the trial. The research objectives were explained for patients who met the conditions to enter the study, and their written consent was attained. The mother was transferred to the labor unit after admission and was monitored by midwives of the research team. In the test group, the Entonox gas was given after consulting with the anesthetist, at the beginning of the active phase of labor (4 cm dilatation or more); it continued until the patient becomes full phase (Honarmandpour & Yaralizadeh, 2017). After admission, one of the midwives of the

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research team trained the mother how to correctly hold the mask and inhale Entonox by a deep and calm inhalation. It must be noted that the narrow part of the mask was placed on the nose and the rounded and curved part was placed on the chin of the mother and the performance accuracy was controlled by the researcher midwife. In this study, Entonox gas was kept at temperatures above 10 °C for 24 hours before use (Field, 2008).

In this research, ethical considerations including acquiring written and informed consent form, random allocation to the test and control groups, explaining the research objectives to the participating patients, not imposing any cost on the patient and the right to withdraw from the study at any time during the research were considered. After collecting data and entering them in SPSS soft ware (version 16), they were analyzed using descriptive and analytical statistics.

3. RESULT

The findings of Table 1 show the demographic characteristics of the mothers participating in the study in the control and test groups. There was no significant difference in the demographic characteristics of the mothers participating in the experimental and control groups in all of the demographic characteristics, except for the gestational age (p> 0.05).

Table 1 demographic characteristic of the mothers participating in the test and control group

Variable		Experiment N(%)	Control N(%)	P-value
Education	illiterate	2(5.3)	4(10)	0.49
	Diploma	11(28.9)	8(20)	
	Bachelor	13(34.2)	20(50)	
	Senior	10(26.3)	7(17.5)	
	Doctoral	2(5.3)	1(2.5)	
Job	housewife	20(52.6)	26(65)	0.27
	Employed	18(47.4)	14(35)	
The economic situation	Weak	6(15.8)	7(17.5)	0.07
	medium	24(63.2)	24(60)	
	Good	8(21.1)	9(22.5)	
Age	M(SD)	27.97(5.32)	26.00(3.76)	0.06
BMI	M(SD)	24.90(2.14)	25.55(1.36)	0.11
Gestational age	M(SD)	40.05(0.73)	40.37(0.62)	0.04

The results of Table 2 showed that Entonox gas reduced the pain of the patients in the experimental group and before the intervention in the test group, the mean (SD) pain was 7.26 (0.55), which after intervention reached 2.44 (0.64). Which was statistically significant (p<0.001).

Table 2 Comparison of mean (SD) of pain score in the control and Experiment groups before and after the intervention at all times of the intervention

Group	Pain in first hour	Pain in second hour	Pain in third hour	Pain in fourth hour	Pain in fifth hour	Pain in sixth hour
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Experiment	7.26(0.55)	5.65(0.70)	5.26(0.79)	3.71(1.03)	2.68(0.90)	2.44(0.64)
Control	7.02(0.57)	7.12(0.68)	5.65(0.76)	6.25(0.66)	6.65(0.73)	6.87(1.36)
P-value	0.07	0.001	0.03	0.001	0.001	0.001

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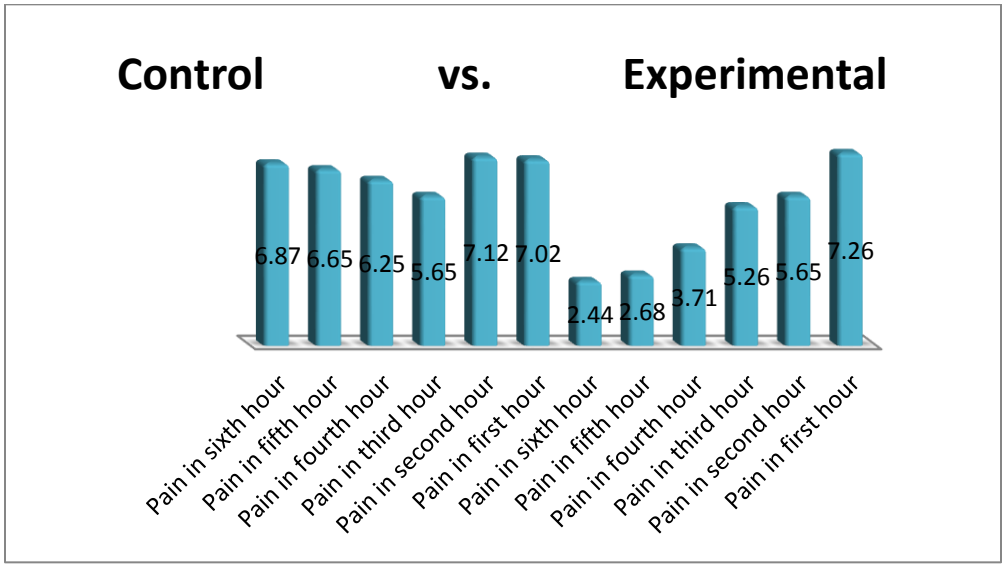

Figure 1 Comparison of mean (SD) of pain score in the control and Experiment groups before and after the intervention at all times of the intervention

4. DISCUSSION

The findings of this study showed that Entonox gas reduced the pain of mothers. Study of Honarmand pour et al. was aimed to compare the effect of Entonox gas and Lidocaine on vital signs during cutting and episiotomy repair of primiparous mothers. Entonox gas was given two minutes before cutting for episiotomy repair and discontinued after cutting and repair. Their findings indicated no negative effects of Entonox gas on patients (Honarmandpour & Yaralizadeh, 2017). In the study of Yeravani which was aimed to determine the effect of Entonox gas on the severity of the labor pain and its duration, the test group received a mixture of Entonox and oxygen while the control group only received ordinary oxygen. The findings revealed that the pain in the first and second stages of labor was significantly reduced in the test group (Iravani, 2008) which is consistent with the results of the present study.

Based on the findings of the present study, Entonox gas decreased the pain of mothers. In a systematic and meta-analysis review by Gareh Sheyklo et al. on an article in the meta-analysis stage, the findings showed that Entonox gas could decrease the pain of neonates, which is in line with the results of current study (Sheyklo et al. 2017). Ahmadi et al. compared the effect of nitrous oxide with oxygen combined with fentanyl, they found that Entonox had a greater impact on pain relief in patients with renal colic (Ahmadi O & Dehkordi AS, 2018), which was in agreement with the results of the present study about the effect of Entonox gas on pain relief.

5. CONCLUSION

Entonox gas can reduce mothers' pain during labor. For this reason, it is necessary to apply this type of intervention as an effective labor pain decreasing intervention.

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This article was approved by the research committee of Ilam University of Medical Sciences with the Project Code. Therefore, the researchers are grateful to the center.

Conflict of interest

No possible conflict of interest was informed by the authors.

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