Original Article

Zahedan Journal of Research in Medical Sciences

Journal homepage: www.zjrms.ir

Effect of Massage Therapy on Labor Progress and Plasma Levels of Cortisol in the Active Stage of First Labor

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Article information

Article history:
Received: 6 Feb 2012
Accepted: 20 Apr 2013
Available online: 28 May 2013
ZJRMS 2013; 15(9): 35-38

Keywords:
Massage therapy
Labor progress
Cortisol

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Abstract

***Background*:** Anxiety and stress during labor increase plasma level of cortisol hormone and slow down the progress of delivery. The purpose of this study is to investigate the effects of massage therapy on the progress of labor and plasma level of cortisol in nulliparous women in labor.

***Materials and Methods*:** In this experimental study, 30 subjects were selected voluntarily among nulliparous women aged 20 to 30 years in active labor phase. They, then, divided into two equal experimental and control groups randomly. The experimental group in the active phase (dilated 3-4 cm) to transitional phase (dilated 8-10 cm) received massage therapy. The massage was done for 10 minutes with 10 minutes rest in between sets. Meanwhile, control group received no intervention. Next, labor duration and plasma level of cortisol hormone were evaluated by drawing blood of parturient women. Results were analyzed using independent *t*-test and paired *t*-test.

***Results*:** The mean age of control and experimental groups were, 23.9±30 and 23.6±4.0 years, respectively. In terms of educational level, 10% in both groups were under diploma, 23.3% and 24.3% of subjects in control and experimental groups, in turn, had diploma, and 16.7% and 15.7% in control and experimental groups possessed bachelor degree, respectively. The results from statistical analysis showed that labor duration and level of cortisol hormone had significant reduction in experimental group than control group ($p \leq 0.05$).

***Conclusion*:** According to the results from comparison between two groups, massage therapy decreases labor duration and the level of cortisol hormone. The probable reason is that massage may reduce stress and cortisol level, and increase uterine activity by decreasing anxiety.

Introduction

Pregnancy is a collection of physiologic, anatomic, and psychological changes that affect different bodily systems. These changes peak in labor time and reduce the level of tolerance threshold in pregnant women. When the delivery time comes, her conditional response is waiting for pain and her brain perceives any contractions as pain, causing stress and increased activation of the adrenal-pituitary-hypothalamic nervous system, hypertension, and heart rate [1, 2]. Based on the results from previous studies on mothers, attending the hospital for caring their hospitalized children, massage causes blood pressure, stress, and anxiety reduction [3]. The studies have shown that massage significantly reduces labor duration, stress, and anxiety [4]. In traditional Chinese medicine, it is believed that stimulation of large intestine 4 (LI4), or Hoku point, which lies in the webbing between the thumb and the index finger and is one of the pressure points of the energy channels of large intestine, not only reduces labor pain but also strengthens uterine contractions [5-7]. Ice massage on the LI4 region causes significant increase in cervical dilatation rate [8]. Severe labor pain and anxiety in the active phase on labor causes increased levels of catecholamine and cortisol hormone leading to reduced uterine contraction strength, uncoordinated contractions, and eventually prolonged labor duration [9]. The previous research on 28 American women showed that massage therapy caused reduction of anxiety, depression, pain, and postpartum depression [10]. Massage therapy along with body relaxation leads to anxiety and stress reduction [11]. Based on the results from previous studies, it is understood that ice massage causes significant reduction in labor duration [12]. With the onset of labor pains, stress hormones increase, which leads to increased respiration rhythm rate, heart rate, energy reduction, and fatigue [13-15]. Stress increases cortisol hormone secretion in all vertebrates in response to various stresses [16]. In addition, cortisol, as the most important stress-induced hormone, is a significant modulator of anxiety disorders [17]. The studies have shown that ice massage significantly reduces duration of the first phase of labor [12] and probably leads to labor pain reduction. The underlying reason is that catecholamine and cortisol hormones, secreting in response to labor pain and anxiety,

cause disruption in progress of cervical dilation, lower the contraction of smooth muscles of the uterine wall, and subsequently prolong labor duration [18]. Since prolongation of labor duration can entail risks to both mother and fetus, so the objective of nursing and midwifery personnel in the delivery room is using suitable methods to shorten labor duration as far as possible. Therefore, this research is conducted with the purpose of investigating the effect of massage therapy on reduction of labor duration and cortisol hormone level.

Materials and Methods

This is an experimental study, whose statistical population includes all physically and psychologically healthy, nulliparous women aged 20 to 30 years, referring to Hafez University in Shiraz, in their active phase of labor. Of the above pregnant women, fifteen volunteers, at 38 to 40 weeks of pregnancy, were selected as research samples. The inclusion criteria included pregnant women who: 1) were nulliparous, haven't taken analgesia and oxytocin medications, and had singleton pregnancy; 2) were with 3-4 cm dilatation, indicating the onset of active phase of labor, which can be measured by vaginal examination; and 3) had at least two to three uterine contractions in 10 minutes when admitted in the hospital. In addition, of the above population a total of fifteen subjects who were maximally matched with experimental subjects in terms of age, educational level, and pregnancy duration were put into the control group. It is worth mentioning that the inclusion criteria for control group were similar to experimental group. The investigated samples were transferred to a previously assigned room, in which the environmental stress inducing factors such as noise, unnecessary commutes, etc were minimized. In this study, stroking massage therapy, including prolonged soft motions with moderate pressure by palm from one end of the long bones to the other end, was performed from shoulder to elbow, lumbar region, and the sacral area. The massage was done for 10 minutes with 10 minutes rest in between sets, from 3-4 cm to 8-10 cm dilatation phases. At the onset of the experiment and at the time of delivery, blood samples were taken from both control and experimental groups. Next, after separation of plasma by means of ELISA kits (Iran Kavoshyar Co.), the levels of cortisol hormone and labor progress and labor progress before and after giving birth were evaluated. It is worth mentioning that before implementation of the project, informed consent letters were obtained from the subjects. In addition, they were provided with full description of the research process and their information was kept confidential. Data were analyzed by descriptive statistics methods, independent t-test, and paired *t*-test, using SPSS-18. It is worth noting that statistical inference threshold was set at significance level of $p<0.05$.

Results

The mean age of control and experimental groups were 23.9±30 and 23.6±4.0 years, respectively. In terms of educational level, 10 percent of subjects in both groups were under diploma, 23.3% and 24.3% of subjects in control and experimental groups, in turn, had diploma, 16.7% and 15.7% in control and experimental groups possessed bachelor degree, respectively. Data analysis showed that massage therapy causes significant increase in progress of delivery and reduction of labor duration at significance level of $p\leq0.05$ (Table 1). In addition, the findings revealed that with labor progression, the plasma level of cortisol hormone increased significantly in both groups; however, this increase was significantly lower in experimental group ($p\leq0.001$) than control group ($p\leq0.0005$), table 2 and 3.

Table 1. The results from independent t-test between control and massage therapy groups based given labor duration (in hour)

group	N	Mean±SD	*p*-Value
Control	15	4.92±2.83	0.046
Massage therapy	15	3.23±1.48	

Table 2. The results showing difference in plasma level of cortisol hormone in pre and post massage therapy stages

Cortisol		Mean (µg/dl)	*p*-Value
Control	pre-test	43.2	0.0005
	post-test	52.9	
Massage therapy	pre-test	30.1	0.001
	post-test	39.5	

Table 3. The results of independent t-test between control and massage therapy groups regarding plasma level of cortisol hormone pre and post massage therapy stages

Group \ Statistical Indicators		N	Mean±SD (µg/dl)	*p*-Value
before intervention	Control	15	43.18±15.6	0.032
	Massage therapy	15	30.05±16.2	
after intervention	Control	15	52.96±15.8	0.047
	Massage therapy	15	39.49±19.5	

Discussion

The results from present study showed that massage therapy in active labor stage caused increase in labor progression, shortening of labor duration, and decreased plasma level of cortisol. In this regard, the findings of this research conform to those of Mory et al. and Christopher et al. [19, 20]. Massage and tactile stimulation can decrease cortisol hormone level and, to some extent, affect the brain centers associated with pain, by exciting the vagus nerve [21]. Massage relieves pain during labor, provides psychological support, reduces anxiety, and increases oxytocin level [4- 21], which can lead to acceleration of labor progression process. Endorphin and enkephalin opioids have significant role in evoking positive feeling and relieving pain, stress reduction, and facilitating peacefulness [22]. Studied have shown that massage therapy causes increased secretion of androgenic opioids [14]. Severe labor pains and anxiety in active labor stage causes increased catecholamine and cortisone hormone levels, leading to decreased strength of uterine

contraction, uncoordinated contractions, and eventually prolonged labor duration [9]. Massage causes opioids secretion by stimulating thick and parasympathetic nerve fibers, leading to pain reduction, inspiration of positive attitude, and increased satisfaction, decreased plasma level of cortisol and catecholamine hormones, and so reduction of labor duration [10]. Pain and emotional stress affect labor duration by increasing catecholamine and cortisol levels. In addition, higher levels of plasma epinephrine can be observed in pregnant women who are with the highest rate of anxiety; these people encounter reduction of uterine activity and prolonged labor duration [23]. Labor pains cause excitation of stress hormones secretion, increased respiration rhythm and hear rate, energy loss, and increased fatigue. Labor-induced fatigues prolong labor duration and decrease mother's cooperative spirit [24-26]. Massage prevents transmission of pain and decreases stress-induced hormones by increasing opioid-induced androgens in the mesencephalic region. In addition, it reduces labor fatigue by inhibiting unpleasant emotions in the mother. Massage therapy during labor causes light and peaceful sleep and lowers fatigue and labor duration by increasing the secretion of oxytocin [13, 14, 16, 27]. Massage therapy for more than 14 days increases pain threshold, and progression of oxytocin mechanisms, and decreases labor duration through mutual effect between oxytocin and opioid neurons [19]. Oxytocin hormone facilitates delivery by exciting uterus during labor and by intensifying the contractions of uterine wall [28]. The studied have shown a high concentration of oxytocin receptors in the nucleolus accumbens [30]. Moreover, affected by opioid systems and increased dopamine in the hypothalamus, massage increases oxytocin secretion [30]. In addition, given the large communications between dopaminergic systems and nucleus limbic system, including nucleolus accumbens, and regarding the increased oxytocin, the level of stress and cortisol decreases [31]. To end with, it should be noted that the present study was with a number of limitations. For example, due to cultural and educational reasons and rare use of analgesia and anesthesia methods during labor, there was a chance of possible disorder in expressing pain. However, this condition was common among all subjects. In hospital, frequent midwifery interventions by residents in obstetrics can play a part in development of extra pains a disorder in the process. This condition was common among all subjects, and so it did not affect the research process.

Acknowledgements

The authors, hereby, thank Research Deputy of Shiraz University of Medical Sciences. In addition, the authorities of Hafez Hospital of Shiraz who cooperated with us in performing this research are highly appreciated.

Authors' Contributions

All authors had equal role in design, work, statistical analysis and manuscript writing.

Conflict of Interest

The authors declare no conflict of interest.

Funding/Support

Islamic Azad University, Fars.

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Please cite this article as: Hosseini E, Asadi N, Zareei F. Effect of massage therapy on labor progress and plasma levels of cortisol in the active stage of first labor. Zahedan J Res Med Sci (ZJRMS) 2013; 15(9): 35-38.