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Assessing effects of BL67 points stimulation on fetal heart rate parameters and fetal movements during nonstress test

Masume Pirhadi, Mahboube Valiani

Abstract:

CONTEXT: One of the main goals of antenatal testing is to identify fetuses at the risk of neurologic injury or death so that these adverse outcomes can be prevented. We want to assess the effects of BL67 points' stimulation on fetal heart rate parameters and fetal movements during nonstress test (NST). We did a quasi-experimental design in Shahid Beheshti Hospital in Isfahan in 2011.

AIMS: This study aims to assessment of the effects of BL67 points' stimulation on fetal heart rate parameters and fetal movements.

SETTINGS AND DESIGN: We did a randomized controlled clinical trial in Shahid Beheshti Hospital in Isfahan in 2011.

SUBJECTS AND METHODS: This study is a quasi-experimental design that was conducted in one group and the two steps (before-after study). Participants were pregnant women (primigravida) who were 35–18 years that refer to Shahid Beheshti Hospital in Isfahan in 2011 to receive routine prenatal care. The 32 pregnant women were selected for acupressure during the second NST.

STATISTICAL ANALYSIS USED: The statistical processing was performed by descriptive, paired *t*-test through SPSS version 20.

RESULTS: There was no significant difference in mean number of accelerations in fetal heart rate and mean number of fetal movement before and after intervention; however, there was a significant difference in mean time to the second acceleration before and after the intervention ($P = 0.04$).

CONCLUSIONS: No difference between parameters of the fetal heart rate before and after stimulation and lack of uterine response by this method is a significant advantage and is probably why stimulating this point could not create a risk to the fetuses.

Keywords:

Acupressure, fetal heart rate, fetal monitoring, fetal movement

Introduction

Having a healthy body and soul is one of the worthwhile blessings of the Lord, and every mother desire to have a healthy child. The realization of children's physical and mental health depends on the prepartum health practices and cares.^[1]

The first goal of antenatal testing during pregnancy is identifying fetuses that are at the risk of neurological damages or death of the fetus, whereas these unpleasant results can be prevented to a large extent.^[2] According to some studies, electronic assessment leads to a significant reduction in the overall risk of prenatal death in comparison to hearing the fetal heart rate periodically,^[3] while Roberts *et al.* in their study concluded that the premature death of infants in the group

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Department of Midwifery
and Reproductive Health,
Isfahan University of
Medical Sciences,
Isfahan, Iran

Address for correspondence:

Masume Pirhadi,
No 37, Borj Alley,
Shahid Rajaei Street,
Isfahan, Iran.
E-mail: pirhadi@nm.ac.ir

who delivered following electronic assessment of the fetal heart rate, was significantly lower than that have delivered without electronic monitoring.^[4]

Usually, assessment of fetal heart rate and movements are the first techniques of assessment of fetal health during pregnancy. Accordingly, one of the first tests to assess the heart and movement of fetus or in other words health of the fetus is nonstress test (NST). The rate of fetal movement and fetal heart rate pattern are evaluated in this test.^[5]

NST is currently the most useful primary method for assessing the health of the fetus. Usually, NST is used as a screening test, and if the result is abnormal (nonreactive), the additional tests such as contraction stress test or biophysical profile will be done.^[6] Given that NST is a simple, less expensive, noninvasive, and does not need uterine contractions,^[7] and it is often used as the first technique to assess fetal health and survival,^[8] and due to the fact that the mother's reference for other tests and treatment interventions is based on the results of stress tests, therefore, developing methods that are likely to increase the diagnostic power of negative (normal) results of test and have chance of shortening the time seems appropriate and necessary.^[9]

To reduce false-positive results of this test, various methods have been suggested such as moving baby, prolonging the time of testing, audio stimulation of the fetus before test and positioning mother during testing, using complementary medicine, and acupressure points. Today, a lot of researches around the world have been done to better and more studying of methods of assessment of fetus health and especially NST. According to the World Health Organization, complementary and alternative medicine includes 65%–80% of health-care services.^[10]

In many studies, various methods of alternative medicine have been studied to improve the diagnostic value of fetus health tests assessment.

Among these methods, in the following studies, the effect of acupressure on BL67 spot is assessed on moving and rotating the fetus. BL67 spot is a strong spot that stimulates the downward movement of the fetus in the womb.^[10] In some studies, by stimulation of this spot during pregnancy in women with breech babies, 75% of the participants had cephalic presentation at delivery.^[11]

BL67 or Zhiyin spot is located on the bladder meridians. This spot is located on the outer surface of the pinky toe hangnail.^[12] It seems that the stimulation of this spot will lead to the movement of the fetus and will increase the likelihood of vertex position in fetus by the

mechanism of stimulating the production of placenta estrogen and turning it to prostaglandin and enhancing the ability of the uterine contractions.^[13-15] Another theory suggests that stimulating this spot will increase the movement of the fetus by activating adrenocortical of fetus, and eventually, it will cause rotation of fetus and changing fetal presentation from noncephalic to cephalic.^[16-18]

In a study of Cardini *et al.* entitled "BL67 spot stimulation with moxibustion to correct breech presentation," results showed that the mean number of fetal movements on the intervention group was more than the control group.^[11]

In 2002, Neri *et al.* conducted a study entitled "Non-stress test changes during acupuncture and acupressure by moxibustion on BL67 spot in the fetuses with breech position," the results showed that in case of receiving correct acupuncture, a significant reduction will occur in baseline fetal heart rate, and a significant increase will occur in the acceleration of heart rate and fetal movement. During the period of placebo acupuncture, no significant change was observed on these parameters. In addition, no clear sign of fetal distress or impairment of the variability of the fetal heart rate and even a sign of uterine contractions has been observed.^[19]

Relying on this important finding that acceleration of fetal heart rate in response to external stimuli has the same predictive value of spontaneous acceleration.^[6] Hence, using appropriate external stimuli to expedite and facilitate NST results seems logical in terms of resources and workforce management principles. Finally, researcher decided to conduct this study to investigate the effect of acupressure on heart rate parameters and the fetus movements.

Subjects and Methods

This research is a semi-experimental study. This research was conducted as an one group and two-step study. This research environment was Obstetrics and Gynecology of Clinic Medical Center of Shahid Beheshti of Isfahan. Sampling method was convenient in this study. Researcher invited all pregnant women who referred to Beheshti clinic to participate in the study for sampling. Then, by completing checklist (including inclusion criteria), identified eligible individuals for the study. Researcher explained the objectives and research method to eligible individuals, and if they still were willing to participate in the study, enrolled them in the study after signing an informed consent and completing personal information on the questionnaire. This research's data were qualitative (discrete-continuous) and were collected by two-part questionnaire that its first part included demographic characteristics, and

the second part was specialized questionnaire included 10 questions related to available information in the fetus's electrocardiogram (ECG). In this study, fifty pregnant women were chosen who met inclusion criteria for the study and They were aged between 18-35 years, had their first pregnancy at 32–36 weeks,^[20] had singleton pregnancies with no history of infertility and used any assisted reproductive techniques, and who regularly visited in health-care centers or private clinics to receive prenatal care, had no disease or pregnancy disorder, not smoking and not receiving any medication.

Before any intervention, fetus NST was performed in the left lateral position and recorded from all participants for 20 min. After first NST, the mother rested for 5 min. Researcher asked mother to sit on the bed after the first fetal NST, and while, she is lying back to prevent fatigue, to put her legs on a chair in front of the researcher. The researcher also sat on another chair in front of mother's legs in a dominant position to mother's fingers, stimulating the BL67 spot located in the outer surface of the third phalange of the little finger of the left foot (located at the hangnail). Researcher pressed at the spot at least for 2 min. The intensity of pressure was in such a way that third of researcher's thumbnail became white. After 5 min, researcher stimulated the same spot for 2 min with pressure. After completion of stimulation, the researcher performed second NST and recorded it.

In the event of any sudden disruption in the health of the mother or fetus, in case of any registration of result, or components of nonstress that there have been doubts about their identification and interpretation or in case of unwillingness of subjects to continue to cooperate, they were excluded from the study. Researcher entered collected data from NST, which includes baseline heart rate of fetus, number of fetus heart rate accelerates, the time of the first and second accelerations, the number of fetus movements and their personal data into the computer using SPSS software version 20 (IBM Company in USA), and analyzed data using descriptive and analytical statistics. Descriptive statistics (mean, standard deviation), frequency distribution tables, and paired *t*-test were used to analyze the data. Researcher considered $P < 0.05$ statistically significant for all statistical tests results.

Results

Based on the results, minimum and maximum age of participants was 20 and 30 (2.8 ± 24.7) years. Nearly 81.2% of the study population's education level was diploma or high school, and 18.8% of them had university education. 93.8% of pregnant women participating in the study were homemakers and 6.2% were employed. Results showed that before the intervention, mean baseline heart rate

of fetus was 7.1 ± 142.2 beats/min, and minimum and maximum base heart rate were, respectively, 125 and 165 beats/min.

Paired *t*-test showed that the mean baseline of fetus heart rate before and after the intervention was not significantly different ($P = 0.83$).

The result of paired *t*-test is confirmed given the lack of significant change in mean baseline of fetus heart rate before intervention (142.2) and after the intervention (142.5).

The average time of the first accelerating of fetus heart rate before intervention was 5.6 ± 4.9 min. The minimum time of the first accelerating of fetus heart rate was 0.4 min and maximum 10.6 min. In addition, the mean time of the first acceleration after the intervention was 5.5 ± 3.1 min. Moreover, minimum time of the first acceleration was 0.3 min, and maximum was 19.8 min. Based on the results obtained before and after performing acupressure, the average time of the first acceleration was not statistically significantly different ($P = 0.149$). This result showed that stimulating of BL67 spot had no effect in the average time of the first acceleration of fetus heart rate.

Results of the study are listed in Table 1.

In addition, paired *t*-test showed that the mean time of the second acceleration of fetus heart rate has a significant difference before and after the intervention. This means that because of the effect of the intervention, the mean time of the second acceleration of fetus heart rate has reduced 2.75 min ($P = 0.048$).

These findings indicate that stimulation of this spot can shorten the time to achieve the test result. This can be a solution in fetuses at risk and in need of emergency measures that give limited time to care providers. Even in wards that despite the large number of patients, there are a limited number of fetal monitoring devices, this type of stimulation can be used to conclude more quickly and to save time.

Table 1: Fetal heart rate parameters and fetal movements before and after intervention

Fetal parameters	Mean±SD		Paired <i>t</i> -test	
	Before intervention	After intervention	<i>t</i>	<i>P</i>
Time of first acceleration	4.9±5.6	3.1±5.5	1.5	0.149
Time of second acceleration	8.5±5.5	5.8±5.9	2.05	0.048
Number of accelerations	5.3±2.9	6.2±3.3	1.3	0.2
Number of fetus movements	13.7±13.3	16.4±15.5	1.2	0.23

SD = Standard deviation

It should be noted that none of the samples have shown evidence of uterine contractions caused by intervention.

Discussion

Some researchers have concluded that there is a significant correlation between fetus heart rate and fetus position.^[21] Based on the results, the mean baseline of fetus heart rate before and after the intervention was not significantly different ($P = 0.83$).

This is while Neri *et al.* in 2007 concluded that acupuncture stimulation along with moxibustion can reduce baseline fetus heart rate and fetal movement, while acupuncture and moxibustion alone had no effect on the baseline fetus heart rate and fetal movements.^[22] While Neri *et al.* in their study stated that during the stimulation on the BL67 spot, a significant reduction has been observed in mean baseline heart rate of fetus.^[19]

Vas *et al.* found that stimulating the BL67 spot leads to an increase in fetal heart rate at the time of stimulation.^[2]

Guittier *et al.* in 2008 found that investigating maternal blood pressure and analysis of fetal ECG (10 min before moxibustion stimulation, 20 min during intervention, and 10 min after completion of stimulation of ECG) showed that everything was normal on ECG, and by stimulating BL67 spot, no unpleasant complication has been observed for the mother and her fetus.^[23] Accordingly, the researcher believes that given the results of various studies about the effect of stimulating BL67 spot on heart parameters and fetal movement and also the safety of the stimulation, it will be useful to explore this method to achieve better results.

In the present study, stimulation did not result in a change in the number of fetal heart rate acceleration. Neri *et al.* in 2007 reported that interventions to stimulate the BL67 spot made no change in the number of fetal heart rate acceleration.^[22] In addition, Habek *et al.* in 2003 in a clinical trial concluded that stimulation of this spot had no significant advantage.^[24]

While in 2002, Neri *et al.* study, researchers reported that during acupuncture with stimulation of BL67 spot, a significant increase has been observed in the number of fetal heart rate acceleration.^[19] The researcher believes that because of study carried on healthy mothers with normal developed fetuses, there was no significant differences between the mean of number of accelerations.

In addition, it is worth noting that all mothers should have walk a specified path to the location for sampling from the Beheshti clinic and the mobility of mothers, provided opportunity to wake up fetus from probable sleep; as a result, perhaps this is a reason for the high

number of fetal heart rate accelerations from the very beginning of NST. Obviously, if the study be conducted on mothers with reduced the fetal heart rate variability or any other condition, different results will be achieved before and after the intervention.

Despite the fact that the number of accelerations of fetal heart rate had no significant statistical difference before and after the intervention, the mothers have reported that after acupressure fetal movements increased. Perhaps, these movements were somewhat weak and delicate, which did not lead to an increase in the number of accelerations.

In the study of Cardini *et al.*, the results showed that the mean number of fetal movements was higher in the BL67 spot stimulation group compared with the control group.^[11,25] Do *et al.* in a study in 2011 stated that stimulation of BL67 spot by the moxibustion method has shown no unpleasant side effects on the fetus.^[26]

Qin-Hong *et al.* in 2013 also stated that stimulation of this spot in addition to be beneficial to change fetal presentation, it also leads to less need of exogenous administration of oxytocin during labor.^[27]

Based on the findings, due to the intervention, the mean time of the second acceleration and reaching the fetal NST results dropped by 2.75 min. These findings indicate that the stimulation of this spot can relatively shorten time to achieve the result of test.

Conclusion

Although fetal NST along with acupressure for stimulating BL67 spot made no changes in most of the studied parameters, lack of change in the parameters of the fetal heart rate and lack of uterine response by this method is a significant advantage and probably that's why stimulation of this spot cannot be a danger to the fetus. As the results show, the base fetal heart rate remains unchanged in response to intervention. However, the time it takes to get reflexive result of the test has been shortened. It is promising that stimulations on fetus did not result in abnormal fetal heart rate patterns, but it has been effective to achieve the result of NST in a shorter time.

In economic terms, it seems acupressure is suitable. Due to the availability of needed equipment and facilities, acupressure is readily available and accessible because it can be performed at any time and without any tools and facilities.

Given that the acceleration of fetal heart rate in response to external stimuli has same predictive value of spontaneous acceleration, it should be noted that in

addition to simple, inexpensive, and safe and available being of acupressure, it did not lead to a negative, false, and transient changes in fetal heart rate parameters. The reason of researcher's claim is that in cases such as baseline heart rate and the number of fetal heart rate accelerations or NST result, above interventions did not lead to false increasing or reduction of these parameters, and therefore, achieving abnormal results and maintained studied parameters in the normal range.

The researcher hopes that similar studies will have been conducted but with larger samples and other methods (acupuncture and moxibustion). It is also recommended to study mothers with reduced fetal heart rate variability or any other medical condition.

This study has been approved by Code Number 390 336 in Isfahan University of Medical Sciences.

Acknowledgment

Although fetal NST conducted with acupressure to stimulation points BL67, in most parameters, studied did not change, no change in the parameters of the fetal heart rate, and uterine lack of response by this method is a significant advantage and probably why, stimulating this point could not create a risk to the fetus. Obviously, that may be studied on women with decreased fetal heart rate variability or any other condition to be achieved different results compared before and after the intervention.

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Conflicts of interest

There are no conflicts of interest.

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