

Comparing the Effects of Acupressure at the Jian Jing-Gall Bladder Meridian (GB-21) Point on the Severity of Labor Pain, Duration and Cesarean Rate in Mono-and Bi-Stage Interventions

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Background: Pain, a common phenomenon, is an inevitable part of childbirth. A number of pressure points exist that reduce labor pain in the body.

Objectives: This study aims to compare mono- and bi-stage acupressure at the GB-21 point on the severity of labor pain and the delivery outcome.

Patients and Methods: This quasi-experimental uni-blind study enrolled 150 full-term pregnant women who were experiencing labor pains. Patients were randomly divided into three groups: a) mono-stage acupressure applied at 3-4 cm cervical dilatation (n = 50), b) bi-stage acupressure applied at 3-4 cm and 7-8 cm dilatation (n = 50), and c) control group (n = 50). Acupressure intervention at the GB-21 point was carried out for a period of 20 minutes. The pain severity was evaluated before, immediately, and at 30 and 60 minutes after intervention by a visual analog scale.

Results: The pain severity after intervention in the 3-4 cm dilatation mono-stage intervention group was less than the control group (P < 0.001). However there was no difference between the mono- and bi-stage intervention groups (P > 0.05). In the 7-8 cm dilatation group, the pain severity was reduced only in the bi-stage in contrast with mono stage intervention groups (P < 0.001). The duration of the second stage and rate of cesarean section was less in the intervention groups (P < 0.001).

Conclusions: Exerting pressure at the GB-21 point is effective in reducing pain, duration of labor and the rate of cesarean sections. Pain can be reduced in the mother by increasing the Frequency interference of intervention (One vs. two stages). Because this method is both inexpensive and reliable, we recommend its use to the medical team.

Keywords: Acupressure; Labor Pain; Cesarean Section

1. Background

Childbirth is a normal, painful physiological phenomenon. One of the reasons is that women become aware of the pain that initiates the process of the delivery and need to reach a safe place to give birth to their baby. Some mothers do not feel pain during labor, rather they consider it an enjoyable experience (1). Labor pain is among the most severe of reported pains in humans and has been compared with the pain that results from cutting the fingers (1, 2). Labor pain along with the fear of delivery increases anxiety in childbearing woman and the increased release of epinephrine is accompanied by uterine contractions that result in prolongation of delivery (3). The severity of labor pain along with the slow, long delivery process create unpleasant mental images

in the parturient. For this reason some women prefer to deliver by cesarean section (4). Research has shown that pain and its connected cognitive variables influence the rate of elective cesarean sections (5-8). Numerous studies have suggested that concerns about the pain of delivery are the most prevalent reasons for requesting elective cesarean sections among women with no prior delivery experience (9-11). In order to reduce cesarean delivery method and promote vaginal delivery, non-pharmacological approaches may be helpful in reducing the labor pain (12). The WHO has estimated that the rate of cesarean sections has increased by 10%-15% in recent years in all countries. This increase has been accompanied by increased concerns in many countries, particularly de-

veloping countries (13). The rate of cesarean sections in the US has increased by 46.0%; this rate was 30.0% in 2005 (14-16). Research has shown that if attention is paid to a mother's need for pain relief during delivery, she will still feel satisfied even if the pregnancy outcome is not good (together with the complications of delivery) (17). There is no specific, usual method for reducing labor pain in maternity hospitals in Iran; this may be attributed to the lack of specialists, high expense and fear of the side effects of analgesics. Therefore application of techniques that do not require specific knowledge or adversely affect the mother and fetus possess special importance. In non-medicinal techniques the parturient is involved in decision making because feelings of power and self-control are effective on labor (18). Acupressure is a non-invasive, inexpensive, safe and simple method. There are several acupressure points in the body for induction and reduction of labor pain. It is believed that stimulating these points can cause the release of oxytocin from the pituitary gland which can lead to better uterine contractions. In addition to energy equilibrium and reduction of labor pain (19).

2. Objectives

Studies have shown that exerting acupressure at the SP-6 San Jiao point Reduces the duration of labor, pain and the rate of cesarean sections (20, 21). Although several studies have also reported the effect of acupressure on onset of labor (18, 22, 23) and reducing labor pain, (24) additional studies are required to confirm these findings. In the majority of studies the intervention has been applied only at the beginning of the active phase of labor; however the severity of labor pain is relatively more at the end of the active phase of delivery. In these studies it has not been specified whether the effects of acupressure on pain reduction remain until the end of delivery or not. Therefore, the current study seeks to assess the following: 1) The GB-21 point is located in the middle of a hypothetical line between the shoulder projection and seventh vertebra of the neck. This point has been introduced as an effective region in reducing labor pain according to acupressure medical sources (25). However no study within the previous ten years has been performed to assess this finding. The current study aims to investigate this point.

2) In the current study, there are two intervention two times, once at the beginning of the active phase of labor (3-4 cm cervical dilatation) and once at the end of the active phase of labor (7-8 cm cervical dilatation). This study intends to determine which intervention is more effective (3). This study also seeks to determine the severity of pain at the end of the active phase of labor in mono-stage intervention in order to determine if the effect of acupressure intervention at the beginning of the active phase of labor is preserved until the end of this phase.

3. Patients and Methods

This quasi-experimental uni-blind study was approved by the Ethics Committee of Shiraz University of Medical Sciences. This study enrolled 150 pregnant women with full term pregnancy who were in labor and referred to Shiraz Hafez and Shoshtari Hospitals. The subjects were selected through convenient sampling and divided into three groups using the table of random numbers and permutation block randomization during the research. Classification was performed as follows: A: acupressure mono-stage, B: acupressure bi-stage and C: control group, with 50 participants per group. (Accordingly, ABC: 1, ACB: 2, BAC: 3, BCA: 4, CAB: 5 and CBA: 6). Inclusion criteria consisted of: nulliparous women between 18-35 years of age; single pregnancy with pregnancy age of 37-41 weeks; cephalic position of the fetus; at or prior to the beginning of the first active phase (3-4 cm dilatation) of labor; no psychological or anatomic disorders; no chronic diseases such as cardiac and pulmonary diseases, blood pressure problems or diabetes; the existence of a low risk pregnancy; no skin conditions such as eczema and epidermis infections; and no use of oxytocin for induction or support of labor. Patients with any type of maternal or neonatal problems that resulted in cesarean or supporting contractions by oxytocin were eliminated from the study. Vaginal examinations were performed by a researcher who was a master student of midwifery. An explanation about the study and its objectives was given at baseline to the study participants. All women expressed adequate knowledge about the method of research and signed written informed consent forms. If a woman was not willing to continue with the study, the researcher tried to persuade them by mentioning the benefits of the research methods. Afterwards, patients unwilling to participate in the study were excluded.

3.1. Administration and Measurements

The interventions were as follows: i) group 1 received acupressure intervention at the GB-21 point with patients who had 3-4 cm cervical dilatation; ii) group 2 received intervention at the GB-21 point at both 3-4 cm and 7-8 cm cervical dilatation; and iii) the control group. Participants of the control group were just touched at GB-21 point (without pressure) at 4-3 and 8-7 cm cervical dilatation in order to assess labor pain before, immediately after, 30 and 60 minutes after intervention. Since many parents attended the labor room, acupressure was performed once for each group in order to prevent interfering results. Participants in the two groups were blinded so that the two groups were not aware of other types of interventions, and only the researcher knew the kinds of intervention. The control group also underwent the practice of the acupressure points simply by touching rather than applying pressure. After the researcher performed a vaginal examination, pressure was exerted at the GB-21 point at the beginning of the contraction

when the cervix was 3-4 cm dilated for the mono- and bi-stage experimental groups. The thumb of the right hand remained on the GB-21 left shoulder point, the thumb of the left hand on the GB-21 right shoulder and pressure was applied. After 30 seconds of pressure, a 30-second rest period was given where the thumb remained in contact with the acupressure point. This procedure was carried out for a period of 20 minutes. Vaginal examinations were repeated every two hours. In the bi-stage experimental group, the second stage of intervention began when the cervix was 7-8 cm dilated. The severity of pain in both groups was evaluated before intervention, immediately after completion of the intervention, and at 30 and 60 minutes after intervention using a visual analog scale (VAS) that measured pain intensity. VAS is a scale which interprets sensation of pain as follows: no pain (0), mild (1 to 3), moderate (4 to 6), severe (7 to 9), and the worst imaginable (10). Bastani et al. (26) in their study confirmed the validity and reliability of the VAS. Internal consistency reliability of the method was determined to be > 80% (26). Before and after intervention, the ruler was shown to study participants who marked their pain level (20). Potential advantages of this scale include a wide score range and high sensitivity (27). Patients' perceptions of pain were reevaluated for the first group only when they were at 3-4 cm cervical dilatation and for the second group, it was reevaluated at 3-4 cm and 7-8 cm cervical dilatation. Thereafter, contact was carried out (without pressure) for a period of 20 minutes on the GB-21 point; the severity of pain was evaluated immediately, and 30 and 60 minutes after contact at both dilatations. Attempts were made to create a specific limit of pressure in each test by repeating the exerted pressure and use of a digital scale. Hence a pressure equivalent to 1710 mmHg under the right thumb and a simultaneous pressure equivalent to 1350 mmHg under the left thumb were measured. To prevent bias, interventions were carried out by the same researcher. All three groups were compared with each other in terms of duration of active phase and second stage of delivery, delivery type and APGAR scores at one and five minutes after delivery. All labor advanced without the use of tools (vacuum and forceps) and there was no epidural use. Data collection tools consisted of a demographic information form and the criterion for numeral grading of pain. The content validity determination method was used to obtain the validity of the information form. Studies have shown that the criterion of numeral grading for evaluation of severity of pain possesses a good validity and has been frequently applied in various researches (28, 29).

3.2. Data Analysis

Collected data were analyzed after coding of the variables, using SPSS software version 18. The independent t-test, one-way analysis of variance and Least Significant Differences; LSD (if applicable), repeated measures analy-

ses and chi-square test were used to analyze the results of this study. $P < 0.05$ was considered to be significant.

4. Results

The mean age of participants was 25.39 ± 4.14 years. Participants had the following levels of education: primary (12.0%), high school (18.66%), diploma (39.33%) and university (30.0%). The mean gestational age was 38.45 ± 0.84 weeks. There was no significant difference between the three groups in terms of age, education level and gestational age.

At 3-4 cm dilatation, the severity of pain was significantly less between intervened groups compared with the control group. In repeated measures analyses comparison of groups 1 (Mono-stage GB- 21) and 2 (Bi-stage GB-21) and 3 (control group) before intervention with immediately, and 30 and 60 minutes after intervention, we found a significant difference ($P < 0.001$). Using LSD multiple comparison test there were no significant differences between the intervened groups; 1 and 2, any time after intervention ($P \geq 0.05$). However, using LSD multiple comparison test there were significant differences between group 1 and control group and between group 2 and control group ($P < 0.001$).

At 7-8 cm dilatation of the cervix, in repeated measures analyses comparison of groups 1 (Mono-stage GB- 21) and 2 (Bi-stage GB-21) and 3 (control group) before intervention with immediately, and 30 and 60 minutes after intervention, we found a significant difference ($P < 0.001$). Using LSD multiple comparison test between each of the two groups 1 and 2, and between 1 and 3, we found no significant difference ($P \geq 0.05$). While, using LSD multiple comparison test between group 2 and control group, we found a significant difference ($P < 0.001$) (As it is shown in Table 2 the severity of pain was reduced only in the 2nd group (Bi-stage GB-21).

The duration of the active phase of delivery was 3.06 ± 1.02 hours in the mono-stage intervention group, 2.86 ± 1.08 hours in the bi-stage intervention group and 3.61 ± 0.67 hours in the control group ($P < 0.001$). The duration of the second stage of delivery was 36.72 ± 12.63 minutes (mono-stage group), 37.45 ± 15.1 minutes (bi-stage group) and 40.44 ± 20.13 minutes (control group; $P = 0.44$) (Table 3). Cesarean sections were performed on 1.0% of women from the intervention groups and 10.0% from the control group ($P = 0.022$) (Table 4). The mean APGAR for the first minute was 9.0 ± 0.45 (mono-stage group), 9.0 ± 0.94 (bi-stage group) and 8.80 ± 0.6 (control group; $P = 0.12$). The mean APGAR scores at five minutes was 10.0 ± 0.00 for the mono-stage intervention group, 9.88 ± 0.7 for the bi-stage intervention group and 10 ± 0.00 for the control group ($P = 0.35$) (Table 5). There were statistically higher levels of satisfaction in the acupressure groups compared to the control group ($P = 0.02$). The difference between mono-stage and bi-stage intervention was also statistically significant ($P = 0.031$). These results indicated that the intervention group had two times more satisfaction.

Table 1. Comparison of the Mean Severity of Labor Pain Before Intervention, Immediately, and 30 and 60 Minutes After Intervention in Study Groups at 3-4 cm Dilatation ^a

Group Severity	Mono-stage GB- 21 (Group 1)	Bi-stage GB-21 (Group 2)	Control (Group 3)	P Value
Before intervention	6.24 ± 1.18	6.30 ± 1.21	6.24 ± 1.70	> 0.05
Immediately after intervention	4.90 ± 1.65	4.94 ± 1.59	6.18 ± 1.91	< 0.001 ^b
30 minutes after intervention	5.48 ± 1.83	5.42 ± 1.66	7.06 ± 1.87	< 0.001 ^b
60 minutes after intervention	5.98 ± 1.81	5.92 ± 1.74	7.90 ± 1.84	< 0.001 ^b

^a Data are presented as Mean ± SD.^b LSD multiple comparison between groups 1 and 3, and between 2 and 3.**Table 2.** Comparison of the Mean Severity of Labor Pain before Intervention, Immediately, and 30 and 60 Minutes After Intervention Among Study Groups at 7-8 cm Dilatation ^a

Severity of Pain	Mono-Stage GB- 21 (Group 1)	Bi-Stage GB-21 (Group 2)	Control (Group 3)	P Value
Before intervention	9.22 ± 0.54	9.24 ± 0.43	9.20 ± 0.94	> 0.05
Immediately after intervention	9.24 ± 0.55	7.12 ± 1.28	9.04 ± 1.04	< 0.001 ^b
30 minutes after intervention	9.56 ± 0.50	7.58 ± 1.20	9.44 ± 0.88	< 0.001 ^b
60 minutes after intervention	9.90 ± 0.30	9.52 ± 0.54	9.90 ± 0.46	< 0.001 ^b

^a Data are presented as Mean ± SD.^b LSD multiple comparison between groups 2 and 3.**Table 3.** A Comparison of the Mean Duration of First Stage Labor Among Study Groups ^{a, b}

Duration	Mono-Stage GB- 21 (Group 1)	Bi-Stage GB-21 (Group 2)	Control (Group 3)	P Value
1st stage, hours	3.06 ± 1.02	2.86 ± 1.08	3.61 ± 0.67	< 0.001
2nd stage, min	36.72 ± 12.63	37.45 ± 15.1	40.44 ± 20.13	0.44

^a Data are presented as Mean ± SD.^b One-way analysis of variance.**Table 4.** A Comparison of the Frequency Distribution of the Type of Delivery Among Study Groups ^{a, b}

Type of delivery	Mono-Stage GB- 21 (Group 1)	Bi-Stage GB-21 (Group 2)	Control (Group 3)	Total	P Value
Normal	50.0 (100.0)	49.0 (98.0)	45.0 (90.0)	241.0 (96.4)	0.022
Cesarean	0.0 (0.0)	1.0 (2.0)	5.0 (10.0)	9.0 (3.6)	

^a Data are presented as No. (%)^b Chi-square test.**Table 5.** A Comparison of the Mean for First and Fifth Minute APGAR Scores Between Study Groups ^{a, b}

APGAR	Mono-Stage GB- 21 (Group 1)	Bi-Stage GB-21 (Group 2)	Control (Group 3)	P Value
First minute	9.0 ± 0.45	9.0 ± 0.94	8.80 ± 0.6	0.12
Fifth minute	10.0 ± 0.00	9.86 ± 0.7	10.00 ± 0.00	0.35

^a Data are presented as Mean ± SD.^b One-way analysis of variance.

5. Discussion

Considering the results of this study, the application of acupressure could be propounded as an effective method in reducing the severity of delivery pain. The two experimental groups effectively reduced the severity of pain compared with the control group. Baseline pain scores were similar in the three groups ($P = 0.48$). The mean severity of pain immediately, and at 30 and 60 minutes after intervention significantly reduced among the experimental groups where intervention was performed at 3-4 cm dilatation ($P < 0.001$). Comparing averages, it was specified that the reduction of severity of pain was maintained until 60 minutes after intervention. In the control group there was a statistically significant difference due to the increased severity of pain ($P < 0.001$). The second experimental group at the second stage of intervention (7-8 cm dilatation) showed reduced severity of pain that was maintained for only half an hour after intervention. One hour after intervention which coincided with the transition stage of labor (dilation 10 cm), severity of pain was higher compared to the pain prior to the intervention. This result confirmed the results obtained by Chung et al. (30). There was no significant statistical difference observed between severity of pain before and after intervention at 10 cm dilatation in the aforesaid study. In a comparison between the two experimental groups at 3-4 cm dilatation, there was no statistically significant difference observed in connection with severity of pain ($P = 0.98$). However this severity showed a statistically significant difference among the two experimental groups at 7-8 cm dilatation when the intervention was performed only in the second experimental group ($P < 0.001$). We compared the severity of pain at both 3-4 cm and 7-8 cm cervical dilatation stages in two experimental groups using repeated measurement test, which showed a statistically significant ($P < 0.001$) reduction in severity of pain after both interventions. It could be concluded that pain could be reduced with increased numbers of interventions. A study in Tehran aimed to evaluate the effect of massage of the SP-6 point on the process of active stage delivery in 120 primiparous women. In this study, the mean of duration and score for severity of pain in the active stage of delivery was less among the intervention group ($P = 0.0001$). Additionally the rate of oxytocin requirement was less in the intervention group compared to the control group ($P = 0.003$) (31). The results of this study were the same as the present study. However in that study the duration of intervention was 30 minutes and simultaneous with uterine contractions which caused the duration of intervention to be varied among different individuals. A study undertaken in Korea evaluated the effect of acupressure at the SP-6 region on labor pain and duration. The experimental group had significantly less severity of pain immediately ($P = 0.012$), and at 30 minutes ($P = 0.021$) and 60 minutes ($P = 0.012$) after completion of intervention than the control group. The

duration of labor in the experimental group was also significantly less than the control group ($P = 0.006$) (18). Another study enrolled 49 pregnant women with pregnancy age of 37-41 weeks. Participants received intervention as ice massage at the Hoko region which lasted for 40 minutes in such a way that the ice massage was performed for 20 minutes on the right hand and 20 minutes on the left hand. The severity of pain after intervention was significantly less than that of prior to intervention ($P < 0.001$) (32). Research has shown that coldness effectively communicates with the sensory nerve fibers in the block (33). The results of the present study confirmed results of other studies (19, 30, 34). One study used electroacupuncture in relieving labor pain at the Hugo and SP-6 points. The mean pain intensity score in the study group was less than the control group. In addition, the study group was more relaxed than the control group which was similar to results of the present study. This study analyzed the levels of β -endorphin (β -EP) and 5-hydroxytryptamine (5-HT) in the peripheral blood to determine the mechanism for the effect of electrical stimulation of acupuncture points. The results showed a significant difference in the concentration of β -EP ($P = 0.037$) and 5-HT ($P = 0.030$) in the peripheral blood between the two groups at the end of the first stage (35). In another study which did not support the results of the present study, acupressure reduced the rate of pain during delivery in only 2 out of 23 women who received intervention (20). The severity of pain immediately after the application of a 20 minute acupressure in the control group showed some reduction compared to the pain prior to palpation. This severity subsequently increased in such a way that, the most severe pain was estimated at 60 minutes after palpation. The reduction in severity of pain immediately after palpation might be attributed to the psychological effect of the attendant's presence with the patient. The greatest reduction in severity of pain in the experimental groups was also observed immediately after intervention; this reduction was greater than that observed in the control group. This reduction in severity of pain was also attributed to the psychological effect of the attendant's presence in addition to the effect of acupressure. After this time, the severity of labor pain naturally increased in the control group due to the lack of a pain reducing method. Hence the presence of a bedside attendant may be effective in reducing pain. However this effect alone is insufficient with progression of delivery; thus an effective, skilled method should be applied. The effects of acupressure are not only due to the presence of the attendant at the parturient's bedside, but also acupressure influences the severity of pain through specific mechanisms. In one study, it was believed that the precise mechanism by which SP-6 acupressure point to reducing labor pain, is not clear (32). This fact is also applicable in case of the mechanism of the effect of acupressure at the

GB-21 point on the reduction of labor pain. Another study on acupressure point SP-6 showed “the use of acupressure points on SP-6 with increasing frequency of acupressure intervention at two stages, 3-4 and 7-8, could generate more painlessness (analgesia) for the mother” (33-36). Hence, in a two-stage intervention (3-4 and 7-8 cm) there was also no difference in pain relief between points SP-6 and GB-21 (37-40). Possibly, reduction in labor pain was produced in the mother by reductions in anxiety levels and acupressure might cause the release of internal narcotics (dinorphin, enkephalin and endorphin) which has resulted in pain reduction. Gate control is another mechanism that causes pain reduction after acupressure. Acupressure activates the thick neural fibers and causes the pain gate to be closed which prevents pain transmission. When the impulses of thick fibers are being stimulated artificially by pressure, the pain gate will be closed (25). In another study, it was suggested that the mechanism of acupressure analgesia occurred by blocking the pain impulse to the brain by increasing A- β fiber transmission (gate theory) (19, 20) or by the local release of endorphins. The pain is controlled by closing of the spinal cord “gate” through activities of nerve cells in the cord with modulation by higher centers (25). Another objective of this study was to evaluate a comparison of the effect of pressure and touching of the GB-21 point on the duration of active phase as well as the second stage of delivery. Considering the results of the present study, acupressure caused a reduction in the duration of the first stage of labor but had no effect on the duration of the second stage of labor. Also, mono-stage intervention showed no difference with bi-stage intervention in the reduction of duration of the first stage of labor which confirmed the results of another study (20). The results of this study showed that APGAR scores of the first and fifth minutes were not statistically different between the three groups. Hence the application of acupressure as care during delivery showed no adverse effects to the neonate which confirmed the results of a study by Chung et al. (30). The results of this study showed that the application of acupressure on the GB-21 point could be propounded as one non-medical method for reductions in both pain and the active phase of delivery. By increasing the times of acupressure intervention at the two stages of 3-4 cm and 7-8 cm cervical dilatation, additional pain relief may be created for the mother.

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Marzieh Akbarzadeh prepared the first draft of the manuscript. Marzieh Akbarzadeh, Zahra Moradi and Azam Jowkar made critical revisions to the paper and translated it into English. Mohammad Javad Hadianfard helped with the technique of acupressure and Dr. Najaf Zare made contributions in the data analysis stage.

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