Original Article

# Comparison of the outcomes of normal vaginal delivery with and without spinal anesthesia in mothers admitted to the maternity ward of Firoozabadi Hospital

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## Abstract

**Introduction and Objective:** The study of the methods of controlling labor pain is very important. One of the methods of pain relief is spinal anesthesia. Due to the different opinions about the effects of spinal anesthesia on the delivery process and maternal and fetal consequences, this study aimed to evaluate the effects of spinal anesthesia and compare it with normal vaginal delivery without spinal anesthesia. **Methods:** In this retrospective cohort study, 120 mothers, who were admitted to the maternity ward of Firoozabadi Hospital for delivery, were examined. The patients who met the inclusion criteria were divided into two groups of 60 people, one group receiving spinal anesthesia and one without spinal anesthesia, and then, were evaluated in terms of clinical variables and complications of the mother and fetus. Data were analyzed using SPSS statistical software. **Results:** The mean age of the mothers was 26.6 ± 5.9 years. Five mothers (4.2%) who received spinal anesthesia underwent emergency cesarean section and a significant difference was shown between the two groups ($P = 0.02$). The mean duration of the active phase of labor did not show a statistically significant difference between the two groups ($P = 0.2$), but the duration of the second phase of labor was significantly longer in the mothers who received spinal anesthesia ($P = 0.008$). **Conclusion:** Spinal anesthesia can be used as a low-complication method in vaginal delivery to reduce pain.

**Keywords:** Anesthesia spinal, apgar score, vaginal delivery, cesarean

## Introduction

The greatest pain that mothers experience during their lifetime is labor pain. This stressful condition leads to negative impacts on maternal and fetal physiology.[1,2] Severe pain, besides its mental aspects, also causes hyperventilation, catecholamines release, and hypertension,[3] and leads to a decrease in the contraction and uterine blood flow which can affect the labor process and blood circulation of the fetus. Therefore, pain management is a crucial matter that has been taken into consideration in recent deliveries and is getting more acceptable among pregnant women.[4] Labor pain causes worry and fear[5,6] and this may lead to a preference

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for cesarean section than vaginal delivery.[7] During the recent decades, a majority of cesarean sections were performed because of the fear of vaginal delivery pain.[8] One way to promote vaginal delivery is painless delivery.[9]

The central nervous system blockage and regional anesthesia techniques are among the effective methods in surgeries and painless deliveries, which are safe for both mother and fetus.[10] It has been shown that regional anesthesia is an effective way to alleviate delivery pain.[11] Epidural anesthesia is when the anesthetic drugs are injected into the epidural space. Generally, drugs are injected via a small catheter into the epidural space.[12] Although epidural anesthesia is the gold standard of anesthesia for delivery, there are some concerns about its side effects.[4,13] Recently, in epidural anesthesia, low-dose anesthetic drugs in combination with opioids were being used, which led to numbness of legs, but opioids could cross the placenta and make the fetus drowsy.[14]

Another effective method of anesthesia that is efficient in reducing labor pain is spinal anesthesia. Spinal anesthesia was introduced 40 years after epidural anesthesia.[15] This method's shorter onset of action leads to increased mother satisfaction with the delivery process. However, there is still concern about the fetus situation which might make the health care provider perform an emergency cesarean section.[9,16] Also, other disadvantages of spinal anesthesia include headache, hypotension, and transient backache.[17] In summary, some of the relative contraindications of spinal anesthesia for vaginal delivery include severe obesity, severe preeclampsia, fetal macrosomia, multiple pregnancy, lack of safe airway, and a history of previous anesthesia complications. Also, lack of patient compliance, injection site infection, coagulation disorders, and allergic reaction to regional anesthesia are categorized as absolute contraindications of spinal anesthesia.[9] Of course, the absence of pain after normal vaginal delivery with spinal anesthesia has been proven in many studies and this advantage is very important in terms of maternal comfort and pain relief.[18,19]

Due to differences of opinion regarding the effects of spinal anesthesia on the delivery process and maternal and neonatal complications, in this article, the effects of spinal anesthesia were evaluated and compared with the outcomes of delivery without anesthesia.

## Material and Methods

### Study design

This retrospective cohort study was conducted in Firoozabadi Hospital in Tehran in 2019. The study population included pregnant women referred to the maternity ward of Firoozabadi Hospital who were candidates for normal vaginal delivery with or without spinal anesthesia. A total of 120 mothers who met the inclusion criteria were included in the study after reviewing the files.

### Inclusion and exclusion criteria

The inclusion criteria included women aged 18–45 years, vaginal delivery without cesarean section either from the beginning or in the middle of the process, singleton pregnancy, without overt or gestational diabetes overt or gestational diabetes, natural hemoglobin, lack of chronic hypertension, and no history of thrombophilia. In addition, women with a history of smoking or drug abuse, kidney disease, and megaloblastic anemia were excluded.

### Method of study and data collection

The mothers who met the inclusion criteria were evaluated by the census method, and after being assigned to two study groups with and without spinal anesthesia (60 people in each group), were examined in terms of maternal and fetal complications. Demographic information, clinical information, and side effects in the table of variables were extracted with the coordination of the person in charge of the ward, based on the history of the patients, progress description, and delivery description sheets. The information was collected confidentially in a pre-designed checklist and entered anonymously into the computer and analyzed to answer the research questions. Data were finally analyzed with the help of statistical analysis.

### Statistical analysis

The analysis of variance (ANOVA) and Student's t-test of significance were used appropriately to test the associations of the dependent variables with independent variables. SPSS v. 25 was used for statistical analysis and statistical significance was assessed at the 5% level.

### Ethical considerations

The research followed the tenets of the Declaration of Helsinki. The Ethics Committee of the Firouzabadi Educational and Medical Center approved this study. Also, the institutional ethical committee at the Medical Center in Tehran approved all study protocols (IR.IUMS.REC.1399.432).

## Results

A total of 120 pregnant women were included in this study. The mean age of the mothers was 26.6 ± 5.9 years. The mean age of the mothers in the group undergoing spinal anesthesia was 25.6 ± 5.3 years and in the group without spinal anesthesia was 27.7 ± 6.3 years ($P$ = 0.06). The mean height of the mothers in the group with spinal anesthesia and the group without spinal anesthesia was 161.3 ± 3.8 cm and 159.7 ± 3 cm, respectively ($P$ = 0.01) [Table 1].

The mean weight was 73.8 ± 9.3 kg in the spinal anesthesia group and 68.7 ± 3.6 kg in the group without spinal anesthesia [Table 1]. Statistical analysis showed that there was a statistically significant difference between the two groups in terms of the mean maternal weight ($P$ < 0.001).

The mean number of pregnancies of the mothers in the group undergoing anesthesia was 1.9 ± 1.2 and in the group without anesthesia was 2.6 ± 1.5. There was a statistically significant difference between the mothers of the two groups in terms of the number of pregnancies ($P = 0.005$).

The mean gestational age of the mothers with spinal anesthesia was 39.3 ± 1.2 weeks and in the group without spinal anesthesia was 38.5 ± 1.9 weeks. The mean gestational age of the mothers in the two groups showed a statistically significant difference ($P = 0.008$).

Thirty-eight mothers (31.9%) were illiterate, 24.4% had elementary education, 21.8% had middle education, 16.8% had high school education or diplomas, and 5% had a bachelor's degree. There was a statistically significant difference between the two groups in terms of education level ($P = 0.01$) [Table 2].

Seventy-three mothers (61.3%) were Iranians and the rest were non-Iranians and Afghans ($P = 0.1$). One patient (0.8%) underwent operative vaginal delivery in the group without spinal anesthesia ($P = 0.3$). Five mothers (4.2%) underwent emergency cesarean section, all of whom underwent spinal anesthesia ($P = 0.02$) [Table 2].

Maternal parity with spinal anesthesia was 1 ± 0.7 and without it was 1.2 ± 0.3. Statistical analysis showed that there was a statistically significant difference between the two groups in terms of the number of live births ($P = 0.006$) [Table 3].

The mothers in the present study had an average of 0.2 ± 0.1 abortions (in the group with spinal anesthesia 0.1 ± 0.4 and without spinal anesthesia 0.3 ± 0.6) ($P = 0.2$).

The mean Apgar scores of 1- and 5-min neonates of mothers with spinal anesthesia were 8.8 ± 0.5 and 9.9 ± 0.2, and in the others were 8.8 ± 0.7 and 9.8 ± 0.7, respectively ($P = 0.7$) [Table 3].

The duration of the second stage of labor was 28.8 ± 19.8 min in mothers with anesthesia and 15.3 ± 12.4 min in mothers without anesthesia. Statistical analysis showed that there was a statistically significant difference between the mothers of the two groups in terms of the duration of the second stage of labor ($P = 0.008$).

The mean duration of the active phase was 165 ± 78.3 min in the mothers who underwent spinal anesthesia and 148.2 ± 78.3 minutes in the mothers without anesthesia ($P = 0.2$).

Twenty-three mothers (38.3%) were treated with fentanyl alone with a mean dose of 1.5 ± 0.5 mcg. sufentanil and marcaine alone were used in 27 patients (45%) and 3 patients (5%), respectively. Combination therapy was used in seven mothers (11.7%). The mean doses of sufentanil and marcaine were 1.2 ± 0.2 mcg and 1.4 ± 1.2 mg, respectively [Figure 1].

**Table 1: Demographic data in spinal anesthesia and without spinal anesthesia groups**

| Parameters | spinal anesthesia (*n*=60) | without spinal anesthesia (*n*=60) | *P* |
|---|---|---|---|
| Age (year) | 25.6±5.3 | 27.7±6.3 | 0.06 |
| Height (cm) | 161.3±3.8 | 159.7±3 | 0.01 |
| Weight (kg) | 73.8±9.3 | 68.7±3.6 | <0.001 |
| Gravida | 1.9±1.2 | 2.6±1.5 | 0.005 |
| Gestational age (week) | 39.3±1.2 | 38.5±1.9 | 0.008 |

**Table 2: General variables in spinal anesthesia and without spinal anesthesia groups**

| Parameters | Spinal anesthesia (*n*=60) | Without spinal anesthesia (*n*=60) | Total | *P* |
|---|---|---|---|---|
| Education | | | | |
| Illiterate | 21.7% | 42.8% | | 0.01 |
| Elementary education | 20% | 28.8% | | |
| cycle or middle education | 25% | 18.6% | | |
| high school or diploma | 25% | 8.5% | | |
| bachelor's degree | 8.3% | 1.7% | | |
| Race | | | | |
| Iranian | 68.3% | 54.2% | 61.3% | 0.01 |
| non-Iranian | 31.7% | 45.8% | 38.7% | |
| Operative vaginal delivery | | | | |
| Yes | 0.0% | 1.7% | 0.8% | 0.34 |
| No | 100% | 98.3% | 99.2% | |
| Emergency cesarean section | | | | |
| Yes | 5% | 0.0% | 4.2% | 0.02 |
| No | 95% | 100% | 95.8% | |

**Table 3: Clinical variables in spinal anesthesia and without spinal anesthesia groups**

| Parameters | Spinal anesthesia (*n*=60) | Without spinal anesthesia (*n*=60) | *P* |
|---|---|---|---|
| Parity | 1±0.7 | 1.2±0.3 | 0.006 |
| Abortion | 0.1±0.04 | 0.3±0.06 | 0.23 |
| Apgar score | | | |
| 1 min | 8.8±0.5 | 8.8±0.7 | = 0.7 |
| 5 min | 9.9±0.2 | 9.8±0.7 | |
| Duration of the second stage of labor | 28.8±19.8 | 15.3±12.4 | 0.009 |
| Duration of the active phase | 165±78.3 | 148.2±78.3 | 0.21 |

## Discussion

In painless delivery, goals such as reducing cesarean section, increasing the desire for normal vaginal delivery, mental peace of mind during delivery, and reducing complications and mortality due to cesarean section are always pursued.[20,21] Our results showed that although the average age of mothers without anesthesia is higher, this difference is not statistically significant. One of the reasons for this is that older mothers have more experience in childbirth and are more mentally and physically prepared to deal with the conditions and pain of childbirth,

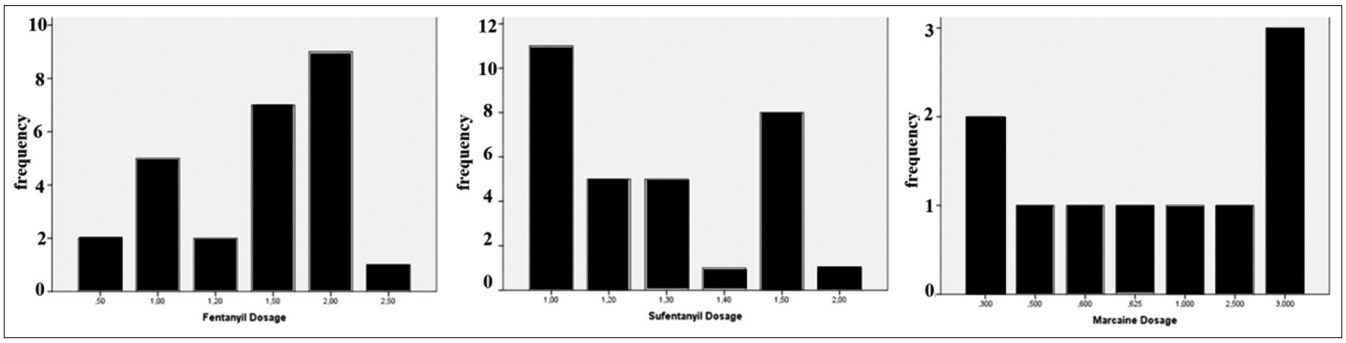


**Figure 1:** Frequency of doses of the drugs used

and therefore, they are less inclined to use painless methods. A study by Michelle J K Osterman and Joyce A Martin also found that the average age of mothers using painless methods was significantly lower.[22]

Our study showed that in mothers undergoing spinal anesthesia, height and weight were significantly higher compared to the group without spinal anesthesia. The examination of the mothers' education level also showed that in the mothers who underwent spinal anesthesia, the education level was significantly higher and the illiteracy rate was lower. One of the reasons for this is the possibility of better income levels of people with higher education who have better financial ability to pay for this procedure. Other studies have been conducted with similar results. In a study by Michelle JK Osterman and Joyce A Martin, it was also mentioned that the desire for painless delivery is related to the level of education of the mothers and their race, so in people with higher education and white women of non-Hispanic descent, the use of this method is more frequent.[22]

In the present study, the average number of pregnancies and deliveries of live babies in the mothers without painless deliveries was significantly higher, which, similar to age, can be related to the experience and higher mental and physical fitness of the mothers. During a similar study by Djaković *et al.*[23] on 3,158 expectant mothers, it was found that spinal anesthesia increased instrumental deliveries and the number of emergency cesarean sections. Also, the rate of dystocia in labor with epidural analgesia leading to emergency cesarean section was significantly increased. The results of the above study were consistent with our study, so in our study, the incidence of cesarean section in the spinal anesthesia group was significantly higher.

In contrast, in their 2015 study, Ismail *et al.*[24] showed that epidural delivery had no effect on cesarean section, but significantly increased the rate of instrumental delivery. The reason for the difference between the results of this study and our study may be due to the difference in the study groups, because they evaluated the epidural and control groups (without anesthesia group), while in the present study, the study groups were different. Also, in our study, only one person underwent instrumental delivery, and that one person belonged to the group without anesthesia.

In this study, it was observed that spinal anesthesia had no effect on increasing the duration of the active phase of labor, but the length of the second stage of normal vaginal delivery was longer in the group with spinal anesthesia than in the group without spinal anesthesia. In a study conducted by Yeganeh *et al.*,[25] the mean duration of the second stage of labor in patients with epidural anesthesia was not significantly different from vaginal labor without anesthesia. Also, another study on vaginal delivery with and without anesthesia showed that the study groups in the second phase of labor were not significantly different but were different from each other in terms of the active labor phase.[26-28] It is noteworthy that the results of this study on the second stage of labor were not consistent with the results of our study, but the results of the active phase of labor in this study were consistent with our findings.

Overall, in this study, the mean duration of the second stage of labor was significantly longer in mothers with spinal anesthesia. Also, the mean duration of the active phase of labor was higher in these mothers, but the statistical study did not show a significant difference between the two groups regarding this variable.

One of the limitations of the study was the incompleteness of some cases, which was eliminated by contacting the individuals. One of the strengths of the present study was the sample size and various demographic and general factors evaluated during the study.

## Conclusion

The duration of the second stage of labor was increased in the spinal anesthesia group and the rate of cesarean section was also higher in the spinal anesthesia group. There was no significant complication in the mothers who underwent spinal anesthesia, therefore, this approach can be used as an appropriate method to reduce the pain of vaginal delivery and make it easier and more logical for mothers to tolerate natural childbirth. Considering the similarity of the Apgar scores in infants, spinal anesthesia can be used to reduce pain in normal vaginal delivery.

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## Conflicts of interest

There are no conflicts of interest.

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