



Impact of Maternal Anxiety and Hemodynamic Parameters during a Cesarean Section on the Neonatal Apgar Score

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Abstract

Background and Objective: The stress and anxiety that a mother experiences during a cesarean section, by stimulating the sympathetic nerves, leads to changes in vital signs that can have adverse effects on the health of the fetus. Therefore, the aim of this study was to determine the relationship between neonatal Apgar score and maternal anxiety and hemodynamic parameters in cesarean section.

Methods: This cross-sectional descriptive-analytical study was performed on 120 patients who were candidates for cesarean section in Fatemeh Hospital in Hamadan in June and July 2020. Samples were selected by random sampling. Data collection tools were a demographic information questionnaire, a vital signs sheet, and neonatal Apgar score, and Spielberger situational anxiety. Data were analyzed using SPSS software version 16.

Result: The results of this study showed that the correlation between the first and fifth minute Apgar score of the infant and anxiety was positively and insignificantly ($p \leq 0.05$). Also, there was no significant difference between the first and fifth minute Apgar score of the infant with heart rate and temperature, but there was a significant relationship between respiration and systolic and diastolic blood pressure.

Conclusion: According to the results, there is no significant relationship between the Apgar score of the first and fifth minute of the baby with anxiety, heart rate and temperature, but there is a significant relationship between respiration and systolic and diastolic blood pressure.

Keywords: Anxiety; Apgar Score; Cesarean Section; Vital Signs

Introduction

Cesarean delivery is one of the most common surgical procedures worldwide [1]. Cesarean section is associated with several

complications for the patient one of the most important of these is pain and anxiety [2]. Hospitalization, surgery, fear of abdominal ulcer infection, the effect of painkillers and other drugs on the baby

and breast milk, and especially having insufficient pain and relief, are the most important sources of anxiety in these patients [3,4]. Anxiety is a common feeling in all patients; about 60% of people who have undergone elective surgery have experienced anxiety [5].

Preoperative anxiety is associated with physiological responses such as hypertension and dysrhythmia and can lead to the patient refusing surgery [6]. Also, preoperative anxiety is associated with problems such as the need for higher doses of drugs to induce anesthesia and postoperative analgesia [7], difficult vein access, and autonomic oscillations. Furthermore, increased pain, nausea, and vomiting after surgery, prolonged recovery, and increased risk of infection occur following anxiety [8]. On the other hand, the emotional states and anxiety of the mother also affect the development of the fetus. Because emotional states affect the mother's nervous system, they release some chemicals such as acetylcholine and epinephrine, which are transferred to the fetus through the placenta, increase fetal movements and have adverse effects on the child's mood in the future [9]. In the case of long-term stress and anxiety, fetal movements become more intense and the baby is born prematurely or the fetus is aborted. In addition, complications such as anemia, hyperactivity, Excessive irritability, and malnutrition are more common in such children [10]. Other possible complications of anxiety include abnormal patterns in fetal heart rate, low Apgar score, increased near-term mortality, and low birth weight, following increased uterine artery resistance due to maternal anxiety [11]. Studies on the relationship between anxiety disorders and obstetric complications are inconclusive and sometimes contradictory. However, the most common reported obstetrics complications are preterm delivery, blood pressure disorders, cesarean delivery, and increase perception of pain during childbirth [12-14]. In terms of neonatal complications, low gestational age and low Apgar scores were the most studied in relation to anxiety disorders [15,16]. Alder, *et al.* reviewed 35 studies published between 1990 and 2005, have reported that Depression and anxiety are associated with adverse outcomes for obstetrics and gynecology and have implications for the health and behavior of fetuses and infants [17]. However, in some studies, this result has not been achieved and no significant correlation has been seen between anxieties, and prolonged labor and decreased neonatal Apgar score [18,19]. Due to the contradictions about the effect of anxiety and vital signs on neonatal Apgar score, the researcher decided to conduct a study to determine the relationship between neonatal Apgar score and maternal anxiety and hemodynamic parameters in cesarean section.

Methods

This cross-sectional descriptive-analytical study was performed from June to July 2020 in Fatemeh Hospital in Hamadan. Samples were selected using convenient sampling from pregnant mothers who had referred for cesarean section and included 120 participants. Inclusion criteria included: Gestational age over 34 weeks, full consciousness, lack of psychological problems and no use of relevant drugs, single-term, and full-term pregnancy. Exclusion criteria were: less than 16 years and more than 45 years old, complicated anesthesia, preterm delivery, women critical conditions including fetal distress, placental abruption, uterine rupture, severe eclampsia, severe pregnancy-induced hypertension, extensive bleeding intraoperative (more than 2000 ml) and underlying diseases such as renal, cardiovascular disorders. Initially, mothers were informed about the objectives of the study and made sure their data was confidential then, they had to sign a written informed consent form to participate in the research and fill out the demographic information form. Then, during the admission of the patient to the operating room, the vital signs and anxiety of all patients were evaluated. Demographic information included age, gestational age, level of education, and occupation. Spielberger Anxiety Questionnaire Used to assess anxiety levels. It specifies the person's immediate anxiety i.e. a person's current feelings in a time span, such as preparing time for surgery. During previous studies, the validity and reliability of this scale were determined. According to Mahram (1994), to achieve the meaningfulness of the result, the average anxiety levels for the standard and normal populations were compared at about 1% and 5% levels for all age groups, which showed the validity of the anxiety measure. Besides, the scientific validity was confirmed using Cronbach's alpha, which was equal to 0.9452 in the normal society and 0.9418 in the standard society [20]. The questionnaire consisted of 20 multiple-choice questions with "very little, little, much, and very much" options. The minimum score of this questionnaire was 20 and the maximum was 80. In this study, the reliability was 0.76 based on the α -Cronbach formula. All research units used digital measuring devices to measure blood pressure and heart rate (ALPK digital blood pressure monitor, Japan). A single device was used for all research units. The number of breaths per minute was measured by observing and touching the chest and using a chronometer. A mercury thermometer was used to detect auxiliary temperatures by standard principles; so that, the patient's armpit was completely dried with gas, the mercury tank was placed exactly in the middle of the armpit and in the deepest part, and the patient's hand was bent

from the elbow and placed on the chest, and the thermometer was placed under the armpit for 5 minutes. The Apgar Form, designed by Virginia Apgar in 1953 to assess infants, allowed obstetricians and midwives to record the infants' physical condition. This test is known as the first standard tool for the early evaluation of a baby. The Apgar score is used to assess vital signs and body functions in infants at one and five minutes after birth. The scale focuses on five physiological factors including heart rate, respiration, muscle tone, response to a mild and painful stimulus, and skin tone. The baby scores from 1 to 2 in each case. Therefore, the total score varies from 0 to 10. An Apgar score of 7 or higher indicates a good physical condition of the baby. If the score is between 4 and 6, the baby's breathing or other vital signs should be stabilized. If the score is 3 or less, the baby is at high risk and requires special medical care [21]. Finally, the collected data were analyzed in descriptive and inferential sections using SPSS software version 16 at a significance level of 5%. In the descriptive part, dispersion distributions and central indices were used and in the inferential part, the Pearson correlation coefficient test was used.

Results

In this study, the mean age of these people was 30.40 ± 5.46 years and their mean gestational age was 37.40 ± 1.66 weeks. 75% of these people had primary education and 58.3% of these people were unemployed. 7.56% of the subjects had elective cesarean section and 43.3% had an emergency cesarean section (Table 1).

Age (years) (mean ± SD)		30.40 ± 5.46
Gestational Age (week) (mean ± SD)		37.40 ± 1.66
Education	Elementary (Frequency (%))	90 (75%)
	Diploma (Frequency (%))	19 (15.8)
	Academic (Frequency (%))	11 (9.2%)
Job	Unemployed (Frequency (%))	70 (58.3%)
	Self-employment (Frequency (%))	30 (25%)
	Official employment (Frequency (%))	20 (16.7%)
Type section	Emergency (Frequency (%))	52 (43.3%)
	Elective (Frequency (%))	68 (56.7%)

Table 1: The demographic characteristics of mothers.

The table below shows the clinical characteristics of mothers and infants (Table 2).

The relationship between neonatal Apgar score and maternal anxiety and hemodynamic indices was evaluated by Pearson cor-

Variables	Mean	Std. Deviation
Anxiety	48.63	5.53
Heart rate (beat/minute)	95.49	14.24
Breath rate (n)	21.80	6.95
Temperature (C°)	36.53	.54
Systolic blood pressure (mmHg)	122.86	16.52
Diastolic blood pressure (mmHg)	75.65	11.54
Apgar score 1 min (minute)	8.5583	.68349
Apgar score 5 min (minute)	9.6667	.47338

Table 2: Clinical characteristics of mother and infants.

relation test. According to the test results, the Apgar score of the first minute of the infant with the level of maternal anxiety has a positive and non-significant linear relationship ($r = 0.081, p = 0.378$), negative and non-significant linear relationship with maternal heart rate ($r = -0.162, p = 0.077$), negative and significant linear relationship with maternal respiration rate ($r = -0.294, p = 0.001$), negative and non-significant linear correlation with maternal temperature ($r = -0.012, p = 0.899$), negative and significant linear relationship with maternal systolic blood pressure ($r = -0.213, p = 0.019$), And a negative and significant linear relationship with maternal diastolic blood pressure ($r = -0.222, p = 0.015$) (Table 3).

Correlation of Variables		R	P-value*
Apgar score 1 min	Anxiety	0.081	0.378
	Heart rate	-0.162	0.077
	Breath rate	-0.294	0.001
	Temperature	-0.012	0.899
	Systolic blood pressure	-0.213	0.019
	Diastolic blood pressure	-0.222	0.015

Table 3: The correlation of Apgar score1 min with anxiety and hemodynamic parameters.

* Pearson correlation test.

Pearson correlation test results show, Apgar score of the fifth minute of the infant with the level of maternal anxiety had a positive and non-significant linear relationship ($r = 0.072, p = 0.437$), negative and non-significant linear relationship with maternal heart rate ($r = -0.104, p = 0.259$), negative and significant linear relationship with maternal respiration rate ($r = -0.286, p = 0.002$), negative and non-significant linear relationship with maternal temperature ($r = -0.040, p = 0.665$),negative and significant linear

relationship with maternal systolic blood pressure ($r = -0.187, p = 0.041$), and had a negative and significant linear relationship with maternal diastolic blood pressure ($r = -0.195, p = 0.033$) (Table 4).

Correlation of Variables		R	P-value*
Apgar score 5 min	Anxiety	0.072	0.437
	Heart rate	-0.104	0.259
	Breath rate	-0.286	0.002
	Temperature	-0.040	0.665
	Systolic blood pressure	-0.187	0.041
	Diastolic blood pressure	-0.195	0.033

Table 4: The correlation of Apgar score 5 min with anxiety and hemodynamic parameters.

* Pearson correlation test.

Discussion

In the present study, the correlation between the first and fifth minute Apgar score of the infant and maternal anxiety was positive and non-significant. The results are consistent with the findings of previous studies as a study by Berle., *et al.* (2005) concluded that anxiety disorder during pregnancy was not associated with a low Apgar score at one and five minutes [15]. In the study by Pavlov., *et al.* (2014), no association was found between anxiety disorders and adverse neonatal outcomes, including small ones for gestational age, low Apgar scores, and prenatal mortality [22]. In the study of Rajabi., *et al.* (2012), they found that there was no significant correlation between anxiety during hospitalization in the delivery room with the duration and type of delivery and Apgar score [23]. Contradictory results with our study such as the study of Hasanjan-zadeh., *et al.* (2017) concluded that there is a significant difference between the variables of depression, stress, and anxiety in terms of birth weight, height at birth and head circumference and Apgar score of newborns [24]. A study by Aslami., *et al.* (2017) concluded that mindfulness training for mothers reduces pregnancy anxiety indices and increases Apgar score in the first minute [25].

The findings of the present study showed that the correlation between the first and fifth minute Apgar score of the infant and hemodynamic indicators such as heart rate and temperature were negative and non-significant but had a negative and significant relationship with systolic and diastolic blood pressure and respira-

tory rate. The results are consistent with the findings of previous studies such as In a study by Zhao., *et al.* (2021), the Apgar scores of the first and fifth-minute infants were lower in the group of mothers who had a fever during childbirth than in the group of mothers who did not have a fever during childbirth, although this difference was not significant [26]. Various studies have shown that Apgar score in the first minute was better in women with normal blood pressure compared to women with preeclampsia [27,28]. The results of their study are consistent with the present study, while in the other two studies, the Apgar score of the first and fifth minutes did not show a significant difference between the two groups, which contradicts the results of our study [29,30]. Also, a study by Parsa., *et al.* (2020), which examined the effect of respiratory techniques on maternal behavioral changes against labor pain and neonatal Apgar score in nulliparous women, concluded that the first and fifth minute Apgar scores there was no significant difference between the two groups that did not agree with the results of the present study [31]. However, the study of Ahmadi., *et al.* (2017) showed that the use of respiratory techniques in the second stage of labor may improve neonatal outcomes, the results of which are in line with our study [32].

Limitations

The reluctance of study participants was one of the limitations of the study.

Conclusion

The results of the present study showed that there was no significant relationship between the first and fifth minute Apgar score of the infant with anxiety, heart rate, and temperature, but there was a significant relationship between respiration and systolic and diastolic blood pressure.

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Authorship Contribution

All authors contributed to the design of the work, data collection, data analysis, drafting this article, and revision of the article.

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Ethics Approval

This study has been approved by the Ethical Committee of Research Vice-Chancellor of Hamadan University of Medical Sciences with the code of ethics IR.UMSHA.REC.1398.960. Informed consent was obtained from all subjects in the Ethics approval and consent to participate section.

Conflict of Interest

The authors declare no conflicts of interest.

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