

## The Relationship between Types of Delivery and Methods of Anesthesia with Occurrence of Jaundice in Term Neonates

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### Abstract

#### Background

Because of severe adverse effects of hyperbilirubinemia on newborns central nervous system diagnosis of its risk factors before delivery can prevent these effects. This study aimed to determine the relationship between types of delivery with jaundice during the first week of life in Term neonates.

#### Materials and Methods

In this retrospective study, all term neonates born in Amiralmomenin Hospital, Semnan, Iran, in 2016 were included into the study. Required data were collected including age, weight, type of delivery, gender, incidence of non-pathological jaundice and type of anesthesia in cesarean delivery using data recorded in the labor ward, hospital archives, and medical records of infants and recorded in a researcher made questionnaire.

**Results:** Mean age of neonates was  $40 \pm 2$  weeks and their mean weight was  $3100 \pm 200$  grams. Among them, 48.8% of neonates with normal delivery and 49.1% of neonates with cesarean delivery were girls. Both groups did not have a significant difference in term of age, weight and gender ( $P > 0.05$ ). In girls, there was no significant difference between type of delivery and hospitalization due to icterus ( $P=0.56$ ). As the same in boys there was no significant difference between type of delivery and hospitalization due to icterus ( $P=0.059$ ). Also, there was no difference in all neonates regardless of their sexuality, between type of delivery and hospitalization due to icterus ( $P=0.078$ ). In cesarean delivery there was no significant difference in icterus severity between general and epidural anesthesia ( $P= 0.21$ ).

#### Conclusion

The results indicate that cesarean delivery was not a risk factor for hospitalization due to icterus during first week after delivery. Further studies are recommended to confirm our results.

**Key Words:** Anesthesia, Cesarean Section, Jaundice, Neonatal.

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## 1- INTRODUCTION

Jaundice is the most common problem in neonates that occurs in 60% of term and 80% of premature newborns in the first week of life (1, 2). The jaundice is usually caused by hyperbilirubinemia with indirect reaction, which in severe cases, if not treated promptly, can lead to free indirect bilirubin deposition in the cerebral tissue and permanent complications of the brain (1, 3, 4). Also untreated jaundice has several extracorporeal effects including renal cell injury, and intestinal mucosal and pancreatic cells injury (1). The onset of jaundice is usually from face that can spread to the abdomen and legs by increasing the amount of bilirubin (5). Due to irreversible lesions resulted from severe hyperbilirubinemia on the central nervous system; newborns who have risk factors such as sepsis, hemolysis, bleeding, polycythemia or maternal diabetes should be closely monitored and as soon as take therapies such as phototherapy (5, 6).

Furthermore, it is better to predict the incidence of jaundice before childbirth in order to prevent complications and to quickly recognize the jaundice in newborns. As all predictors of neonatal jaundice including premature, maternal diabetes, maternal and neonatal maladaptation is considered by physicians even before birth (5). Hence, the recognition of the relationship between the type of delivery and the method of anesthesia in cesarean section with the incidence of jaundice resulted in hospitalization in newborns can be important. The main aim of this study was to investigate the potential risk factor of neonatal jaundice in addition to the risk factors that have been identified so far. Considering these risk factors, physicians can early diagnose and treat jaundice (7). The results of some studies indicate that jaundice is more common in neonates with cesarean delivery compared to normal delivery neonates (5, 8). Also, the

anesthetic method including general anesthesia or spinal anesthesia has been introduced as an effective factor in the development of neonatal jaundice (7, 9). However, in other studies that examined jaundice in cesarean section and normal delivery as well as types of anesthesia during cesarean delivery, there was no significant difference in the incidence of jaundice between the delivery type and anesthesia methods (10-12). Therefore, because of controversy in results of studies (5-13) in this regard, this study aimed to determine the relationship between types of delivery and methods of anesthesia with occurrence of jaundice during the first week of life in Term neonates.

## 2- MATERIALS AND METHODS

### 2-1. Study design and population

In this retrospective study, all term neonates born in Amiralmoemenin Hospital, Semnan, Iran, in 2016 year were included into the study. On the basis of Elsayd et al. study (8), the sample size calculation was based on the assumption that a 2.5-point difference between normal delivery group and cesarean group would be clinically significant. Assuming a standard deviation of 2.25 points, an alpha of 0.05, and a beta of 0.20 (power of 0.80); this analysis indicated that a sample size of at least 375 patients per group was necessary. In our study, 1,176 cases were included into the study.

### 2-2. Methods

After selecting the patients, newborns were divided into two groups: natural born and neonates with cesarean delivery. Then, patients' medical records were investigated and neonates who were hospitalized for non-pathological jaundice were considered as jaundice. Also, neonates with jaundice that bilirubin levels with regarding age of the newborns were in the risk area, it was considered as severe jaundice.

### 2-3. Measuring tools

Required data were collected from available documents (data recorded in the labor ward, hospital archives, and medical records of infants) including type of delivery, gender, incidence of non-pathological jaundice and type of anesthesia in the cesarean section delivery using a questionnaire. Patients with incomplete information in their medical records were excluded.

#### 2-4. Ethics consideration

This study supported by Ethical Committee Semnan University of Medical Sciences approved.

#### 2-5. Inclusion and exclusion criteria

Inclusion criteria were term neonates (37 – 42 weeks) and normal weight (2,500 – 4,200 grams). Patients with pathological jaundice due to factors such as infection, bleeding, hemolysis, polycythemia, glucose 6-phosphate dehydrogenase deficiency (which was checked in all patients) or diabetes mellitus were excluded from the study.

#### 2-6. Data Analyses

Data analysis was done using SPSS 16.0 software and Chi-square test to determine relationship between delivery type, anesthesia method and gender with developing jaundice, Mann-Whitney to examine the mean deference of age and weight of newborns, and relative risk tests. P-value less than 0.05 were statistically significant.

### 3- RESULTS

This study aimed to determine the relationship between types of delivery and methods of anesthesia with jaundice during the first week of life in term neonates. In this study, after removing 10 patients' medical records due to incomplete documentations, 1,176 delivery were investigated that 432 (36.7%) cases were normal delivery, and rest (n=744,

63.3%) were cesarean delivery. Mean age of neonates were  $40 \pm 2$  weeks and their mean weight was  $3,100 \pm 200$  grams. Among them, 48.8% of neonates with normal delivery and 49.1% of neonates with cesarean delivery were girls. Both groups did not have a significant difference in terms of age, weight and gender ( $P > 0.05$ ). Totally, jaundice was found to be responsible for 7.6% of hospitalized neonates including 5.8% (25 cases) of neonates with normal delivery and 8.6% (64 cases) of neonates with cesarean section.

The relationship between type of delivery and jaundice was not significant (relative risk [RR] = 1.48, 95% confidence interval [CI] = 0.79-0.90,  $P = 0.078$ ). The incidence rate of jaundice in girls with cesarean section delivery and normal delivery were 7.9% and 6.3%, respectively, which were not significant relationship between type of delivery and jaundice with girl gender (RR = 1.19, 95% CI = 0.51 - 1.73,  $P = 0.56$ ). Also, the incidence of jaundice in boys with cesarean section delivery was 9.2% and with normal delivery was 4.97%. There was no significant relationship between type of delivery and jaundice with boy gender (RR = 1.85, 95% CI = 0.96 - 3.95,  $P = 0.059$ ) (**Table.1**).

Of the 25 newborns with normal vaginal delivery and jaundice, 48% (n=12) had severe jaundice and of the 64 newborns with cesarean section delivery and jaundice, 35.9% (n=23) had severe jaundice. There was no significant relationship between jaundice severity and type of delivery ( $P = 0.29$ ) (**Table.2**). Of the 64 infants born with cesarean section, 73% (n=47) had mothers with spinal anesthesia; while 27% (n=17) of them had general anesthesia. No significant difference was found between the two groups in terms of developing severe jaundice ( $P = 0.21$ ) (**Table.2**).

**Table-1:** The relative risk of jaundice occurrence based on the type of delivery in neonates

Gender	Type of delivery	Developing Jaundice Number (%)		Relative risk	95% CI	P- value
		Positive	Negative			
Girl	Cesarean	29 (7.94)	336 (92)	1.19	0.51 – 1.73	0.56
	Normal	14 (6.6)	197 (93.4)			
Boy	Cesarean	35 (9.2)	344 (90.8)	1.85	0.96 – 3.95	0.059
	Normal	11 (4.97)	210 (95)			

95%CI: 95% confidence interval.

**Table-2:** The relationship between type of delivery and type of anesthesia with severity of jaundice in neonates

Variables		Mild and Moderate jaundice Number (%)	Severe jaundice Number (%)	P-value
Type of delivery	Normal vaginal	13 (52%)	12 (48%)	0.29
	Cesarean	41 (64.1%)	23 (35.9%)	
Type of anesthesia (n=64)	Spinal	34 (72.5%)	13 (27.5)	0.21
	General	7 (41%)	10 (59%)	

#### 4- DISCUSSION

In this study, the gender of newborns was considered as an independent variable. There was not statistically difference in terms of hospitalization due to jaundice between two delivery methods. The incidence of jaundice resulted in hospitalization was 7.6%, which 5.8 (n=25) and 8.6% (n=64) were related to normal and cesarean deliveries. In total, there was no statistically significant difference between the two methods of delivering cesarean and normal due to jaundice (P = 0.078). Alkan et al. (2010) compared incidence of jundice in 68 neonates with cesarean and 155 neonates with normal delivery. They concluded that method of delivery has not correlated with total bilirubin levels (10). In Agarwal et al. study, 50 mothers were evaluated for risk factors of jaundice in their newborns, which their study showed that the type of delivery does not affect the rate of neonatal jaundice (11). Also, several studies have pointed to the lack of relationship between the type of delivery

and neonatal jaundice (14-17). El-Sayed et al. who investigated 1,285 mothers and their neonates, the percentage of cases of neonatal jaundice in cesarean section was 17.4% and in normal delivery was 10.2%, which a statistically significant difference between two methods of delivery was seen (P = 0.004) (8). In another study by Chang et al., conducted on 252 neonates with jaundice, the bilirubin level was significantly higher in neonates with normal delivery than in the cesarean section. Furthermore, use of oxytocin and vacuum were reported as risk factors for jaundice in neonates with normal delivery (18). Since consuming supplemental nutrition in neonates with cesarean section is more than newborns with normal delivery, it may be cause of higher incidence of jaundice in neonates with normal delivery (19, 20). Considering the controversial results in numerous studies conducted on the relationship between type of delivery and hyperbilirubinemia, it seems that factors such as the difference between the selected variables, the study

conditions, and the number of samples effects the results of the study. In our study, general anesthetic methods with isoflurane and spinal anesthesia with bupivacaine were compared in cases of cesarean section. The severity of jaundice was compared between the two methods of anesthesia, which showed no significant difference between the two methods in terms of the incidence of severe jaundice ( $p=0.21$ ). De Amici et al. investigated mothers with cesarean section with different anesthetic methods in terms of bilirubin level, which in their study total bilirubin level in general anesthetic group with isoflurane was significantly higher than spinal anesthesia group with bupivacaine ( $P < 0.0002$ ) (9). In Demiraran et al. study, in newborns with cesarean section, the incidence of jaundice was higher than normal vaginal delivery ( $P < 0.05$ ) (7); while Eskicioglu et al. showed that there is no difference between the type of anesthetic technique and neonatal jaundice (21).

#### 4-1. Limitations of the study

The low number of newborns with jaundice and design of the study was the limitations of our study. Therefore, prospective studies with a larger sample size and also studies in several hospitals are suggested.

#### 5- CONCLUSION

There is controversy about considering cesarean delivery and general anesthesia as risk factors for developing Jaundice in Term neonate in prior studies. According to the present study, cesarean delivery and general anesthesia were not associated with occurrence of jaundice. It seems that, further studies are needed in this field.

**6- CONFLICT OF INTEREST:** None.

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