



The effects of ketamine on maternal hemodynamics, awareness during childbirth, and neonatal Apgar scores in Najaf City

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Abstract

Aim of the research: The research aimed to evaluate the physiological and pharmacological effects of ketamine on neonatal health immediately after birth, focusing on key indicators such as skin condition, heart rate, respiration, and responsiveness to external stimuli.

Material and Methods: The study was conducted in maternity hospitals in the Al-Najaf Al-Ashraf Governorate, involving 25 childbirth cases where ketamine was used for anesthesia. Its primary objective was to assess the drug's effects on both maternal well-being and neonatal health in the crucial moments following delivery.

Results: The results showed that ketamine influenced various physiological parameters, including cardiac function, with newborns displaying noticeably elevated heart rates compared to those not exposed to the drug. Despite these effects, the induction, awakening, and recovery times remained within normal limits. Additionally, significant variations were observed in body temperature, respiratory rate, oxygen saturation (SpO₂), and pulse rate, with both increases and decreases occurring in response to ketamine administration.

Conclusions: From above findings highlight the need for careful monitoring of both mothers and newborns when using ketamine in obstetric anesthesia.

Keywords: Ketamine, hemodynamic, Apgar score, neonates

Introduction

A period of a caesarean section, which is also referred to as a C-section, the mother's uterus and abdominal wall are cut in order to deliver the baby [1]. Using this approach is typically used when vaginal delivery is not possible or poses a risk to the mother or child [2]. Various anaesthetic types, including spinal anaesthesia, general anaesthesia, or a combination with a couple, may be used during a caesarean delivery. The mother's medical history, the baby's position, and any allergies or drug sensitivities she may have all influence the anaesthetic prescription [3]. Propofol and thiopental sodium are frequently employed during initiation of a caesarean section. Types of anaesthetic is applied will affect hemodynamic parameters like blood pressure, heart rate, oxygen saturation, and APGAR score, resulting in figure out the newborn's condition at birth [3, 4]. Ketamine is the best anaesthetic agent for hypotensive illnesses because it increases the emit of catecholamines and inhibits their reuptake, maintaining arterial blood pressure and vascular resistance [5]. In anaesthetic execution, shivering while on surgery is an ongoing issue that, unless properly controlled and prevented, can cause discomfort and possibly fatal consequences, particularly in cardiorespiratory individuals. [6]. Shivering can occur in surgical patients for a number of reasons, such as the surgical procedure, anaesthesia, cool functioning room, and the administration of frigid fluids. There are numerous of pharmaceutical and non-pharmacological strategies to treat and prevent this sort of issue [7, 8].

The Apgar score is dependent on multiple variables, such as color, breathing, muscular tone, heart rate, and reflexes [9]. For the purpose of to detect blood circulation compromise symptoms such bradycardia, hypotonia, cyanosis, hypoperfusion, respiratory depression, or apnea, Apgar

score is used. Each component receives a score of either 1 or 2 [10]. All newborns have their scores taken at one minute and five minutes. To track response, the recording is increased to five-minute intervals for infants who score seven or lower at five minutes, as well as for those who need resuscitation [1]. A score between 7 and 10 is regarded as comforting [11-13]. Subsequent investigation, however, have shown that ketamine has a variety of molecular effects and is useful in the treatment of a wide range of illnesses, such as acute and chronic pain [4, 14, 15]. Additionally, fast-acting antidepressants suggest that ketamine could minimize the opportunity for spinal-induced hypotension during caesarean delivery through a ketamine sympathomimetic outcome [16]. Thus, it seems that the initial of the research objectives is required to ascertain how well ketamine infusion affects hemodynamic parameters in patients and their children undergoing caesarean delivery [17, 18].

Material and methods

A number of hospitals provided women undergoing general anaesthesia for caesarean sections: Four cases were chosen while under the influence of ketamine anaesthesia at the first hospital, Al-Zahraa Teaching Hospital of Maternity, which is located in the middle of the Iraqi region of Al-Najaf Al-Ashraf. Another hospital within Al-Najaf Al-Ashraf province is called Al-Furat Al-Awsat Hospital. It picked eight cases that were taken previously under the precise same ketamine influence. Four cases have been collected from this hospital and the third hospital, Al-Hayat Al-Ahly, all of which were treated under a similar anaesthetic scheduling. Nine patients were admitted to the final hospital, Al-Manathira Surgical Centre, in the same province of Al-Najaf Al-Ashraf, after ketamine was administered as an anaesthetic with same conditions. Every

premature baby case that was gathered from these hospitals included both natural birth and C-sections. Consequently, the same setting and tests selected for this study have been applied to both types of births.

Statistical analysis

The data was coded, processed, and analysed via SPSS (Version 25) for Windows. Descriptive statistics like mean, standard deviation, percentage, range, and median were established. For ongoing variables, the significance between healthy average data was compared through independent t-tests [19].

The Result and discussion

The results of the current study in table 1, 2 indicated that there were no laryngeal spasms in all cases of birth under ketamine anesthesia, and there were also no complications for mothers after cesarean section. On the other hand, it was observed that there was a change in all physiological parameters at the heart level, including contraction and relaxation, while heart rate was clear increased as compared with normal range. Induction period, awaking time and recovery time was within normal limit.

Table 1: Effect of ketamine on some parameters of women under caesarian section.

Parameter	Yes	No	P value
laryngeal spasm	0(0)	25(100)	<0.0001
pain during surgery	6(24)	19(76)	<0.0001
Post-operative complication	0(0)	25(100)	<0.0001

Table 2: Effect of ketamine on some physiological function of women under caesarian section.

Parameter	Mean	SEM	Range
Heart rate	115.75	4.23	70
Induction period	1.8	0.15	2
Awaking time	4.26	0.29	5.5
Recovery time	16.92	1.16	20
Systolic pressure	124.16	4.5	105
Diastolic pressure	74.04	3.28	55

The current study showed that (Temperature, Resp. rate, Spo2 and Pulse rate) parameters showed a significant increase respiratory rate and reduce among other parameters table (3) while Skin color change four cases showed yellow appearance from six neonates while 5 cases from 15 neonate appear yellow color table (4) that indicate there is no a significant difference compared with normal parturition.

Table 3: Effect of ketamine on normal function of neonate

Groups	Temperature	Resp. rate	Spo2	Pulse rate
normal	36.78±0.18	44.83±3.69	95.83±1.49	157.66±5.89
Ketamine groups	36.46±0.17	50.13±4.32	91.66±2.48	146.33±4.15
Calculated p	0.302*	0.477*	0.166*	0.151*

* No significant difference at P<0.05

Table 4: Effect of ketamine on skin Apgar score on neonate at level of skin color

Groups	Total No.	Skin color	
		Normal color	Yellow
normal	12	8(66.66)	4(33.33)
Ketamine groups	15	10(66.66)	5(33.33)
Calculated p		1*	

* No significant difference at P<0.05

The current study noted that natural birth appears good Apgar score than child birth or parturition under ketamine anesthetic table 5.

Table 5: Influence of ketamine general anesthesia on Apgar score in newborns

No. of cases	Apgar score at 1 min			Apgar score at 5 min			Apgar score at 10 min		
	0-3	4-6	6-10	0-3	4-6	6-10	-	-	15
15 Normal Child Birth	2	3	10	1	1	13	-	-	15
30 Child Birth General Aesthetic Under Ketamine	7	15	8	3	6	21	1	2	27

The neonate caesarean section deliveries under general anasthesia influenced skill of the anesthetics and by obstetrician preferences. There are many studies reported by many studies [20]. This may be due to the influence of the general anaesthetic drugs crossing the placenta and influencing the neonate. As ketamine is a highly lipid soluble and minimum protein binding (25%) and cross the placenta, reached umbilical venous blood within 20 sec. and peak concentration reach within 1-2 min [21]. ketamine-induced neurotoxicity so number of studies to develop alternatives to ketamine or treatments that can alleviate the detrimental effects of ketamine use, especially in infants and pregnant women [22]. Apgar scores were not intended to be an outcome measured, but Instead of that help in know newborns in requirement of oxygen for breathing or other resuscitation techniques. The Apgar score by itself is not sufficient to establish an intrapartum hypoxic episode or hypoxia. Negative clinical outcomes or long-term health difficulties are not predicted by a minimum Apgar score of zero to 1 at first minute, as majority newborns, even those with extremely low 1-minute scores, will have normal scores after 5 minutes [10].

Apgar scores minimum at 5 minutes associated with refer to cerebral palsy development or mortality while Scores least than 5 at five and ten min related with an tendency to cerebral palsy risk. Umbilical artery blood gas spacemen should be done for neonates with scores less than five at 5 minutes [7, 23]. Ketamine potentiate sympathetic neurotransmitter release and inhibit reuptake, thereby control hypertension of arteries and their peripheral resistance, so that consider an optimal anesthetic drug for hypotensive conditions. The current study noted that ketamine received patients showed blood circulation stability in terms of mean blood pressure, pulse rate and HR (P < 0.05). These findings agree with study confirmed by Salah and Alansary noted that a low dose of ketamine could be used to control hypotension following epidural anaesthesia in CS [24] as well as Ketamine helps patients getting spinal anesthesia after cesarean delivery experience less hypotension and shivering. Furthermore, the mother experienced better sedation and longer postoperative analgesia without any newborn complications.

Conclusion

The present study on maternal childbirth showed that ketamine has negative influence on physiological function as well as influence of apgar scores of neonates.

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