

Small Dose Ketamine (5 mg) to Prevent Postoperative Pain in Pediatric Patients Undergoing General Anesthesia for Short Procedures

Dr. Murooj Luai Majeed Altimimi

Assistant Professor in Pharmacology in the Pharmacology Department at Kufa Medical College, Al-Najaf, Iraq

Abstract: Ketamine is an intravenous anesthetic drug used for the induction of anesthesia and to prevent post-operative aches. The purpose of having a look at this is to determine the effectiveness of ketamine in small doses as a postoperative pain reliever.

This examination was carried out in different hospitals in Iraq during the period from November 1, 2024, to March 5, 2025, on 100 adult patients who underwent brief approaches under general anaesthesia. Information was gathered in a standardized format, which consisted of age, sex, type of surgical operation, size of the tube, and mode of ventilation. In addition to the drug used in the course of each stage of anaesthesia, including Premedication if used, induction agents and maintenance marketers, including IV fluids, moreover the essential signs and symptoms in addition to Spo2 (before and after 15 minutes of the method) The records and records had been gathered one by one for each affected person and inclusion standards encompass adult affected person present process fashionable anaesthesia for quick approaches. Pain is a distressing feeling that is frequently because of extreme or adverse stimuli. The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional enjoy associated with or corresponding to that related to actual or capability tissue damage. In clinical diagnosis, an ache seemed like a symptom of an underlying situation. Conclusion:- Administration of ketamine in a low dose (5 mg) decreases postoperative pain in Pediatric present process the preferred anesthesia for brief tactics.

As a consequence, the records get from Ketamine and non-ketamine display tremendous exceptional; the ketamine institution displays a considerable decrease inside the ache stage.

Keywords: Drug, Anaesthesia, Ketamine, Treatment, Low Dose, Induction Agent, Tissue.

Introduction

Ketamine is majorly used as a treatment agent in the induction and maintenance of anesthesia. It causes a dissociative anesthetic condition, which is a trance-like state that provides analgesia, sedation, and amnesia in the anterograde direction [1]. The critical factors of ketamine induced anesthesia include maintenance of lung ventilation and bronchio-sphincter reflexes, increased cardiovascular activity manifested in hypertension, and slight bronchodilation [1]. Ketamine in sub-anesthetic levels has shown promise in refractory nociceptive pain as well as major depressive disorder, which is not responsive to the traditional modalities [2]. However, its short-lived effects as an antidepressant when used in only one dose, and the lack of extensive information on repeat dosing, are not been investigated sufficiently [3,4,5]. Ketamine was first synthesized in 1962 and was approved by the United States regulators in 1970. Its uses have also

been applied in veterinary anesthesia in dogs and horses, especially in the Vietnam War, where it was greatly used in veterinary procedures [4].

Besides its clinical use, ketamine is also subject to recreational use that is often intercepted in powdered or liquid preparations that are typically sold as a hallucinogenic and dissociative drug known as Special K due to its ability to induce hallucinations and dissociation [5]. The drug is listed in the World Health Organization List of Essential Medicines [6], and is also generic [7].

Opioids are a group of substances which bind to opioid receptors to produce some analgesic and other physiologic effects similar to morphine [8]. They are mostly used clinically as a nociceptive management, and can be used in anaesthetic protocols [9]. Additional indications of use include diarrheal suppression, alternative treatment of opioid use disorder, opioid overdose reversal, cough suppression [9], and, in some jurisdictions, in capital punishment procedures. Potent opioids like carfentanil are limited to veterinary indications only [10]. Sociologically, opioids are commonly misused due to its euphoric properties or to treat the withdrawal sequelae [11]. The negative outcomes linked with opioid medication regimes can be pruritus, sedation, nausea, respiratory depression, constipation, and euphoria. Repeated use may lead to tolerance, which requires more and more dosage to induce a therapeutic effect, leading to the development of physical dependence, where withdrawal symptoms are produced when the drug is suddenly stopped.

Material and methods

the current research carried out was performed in various hospitals in Iraq between 1 November 2024 and 5 March 2025.

The 100 participants were separated into two groups:

- Group (A) comprised 50 patients who were treated with either ketamine and fentanyl or tramadol.

Group (B) consisted of 50 patients who were treated with fentanyl or tramadol.

The standardized questionnaire was used to collect the data on the demographic variables (age, sex), the specifics of the surgery (type of surgery, the size of tracheal tubes), ventilatory mode, and pharmacologic agents used at every step of the anesthesia process, including premedication in some cases, the induction agents, the maintenance agents, and the intravenous fluids. Moreover, vital signs and arterial oxygen saturation (SpO_2) were measured before and after the procedure (15 minutes).

The individual data of each participant were taken separately. Inclusion criteria included pediatric patients who were undergoing short-term general anesthesia.

Table 1: Materials used to collect disease cases.

No.	Materials	manufacture company
1	Endotracheal tube Size 6,7,5	Enteplin
2	Propofol	wellex
3	Cannula	Corden Pharma SPA
4	Syring	Luxamed
5	Laryngoscopes	Kilani
6	fentanyl	phenylpiperidine
7	tramadol	Mundipharma
8	ketamine	Liorad
9	Laryngeal mask	Corden Pharma SPA

Study Tools:

Instruments utilized in the study comprised a non-invasive blood pressure machine for measuring blood pressure, along with pulse oximeter probes to assess the oxygen saturation levels of the patients where in our study Additionally, IV cannulas and various medications were employed, including metoclopramide, dexamethasone, tramadol, fentanyl, propofol, ketamine, rocuronium, and atracurium also Oxygen and isoflurane or sevoflurane were administered for the induction and maintenance of anesthesia. The delivery of anesthesia was facilitated by Drager Fabius' anesthetic machines. Stopwatch were employed to time the duration of intubation or LMA insertion. The monitoring of systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) in patients was conducted using Drager Infinity Gamma XL monitors.

Results:

Figure 1 Shows the gender male and female genders in the cases.

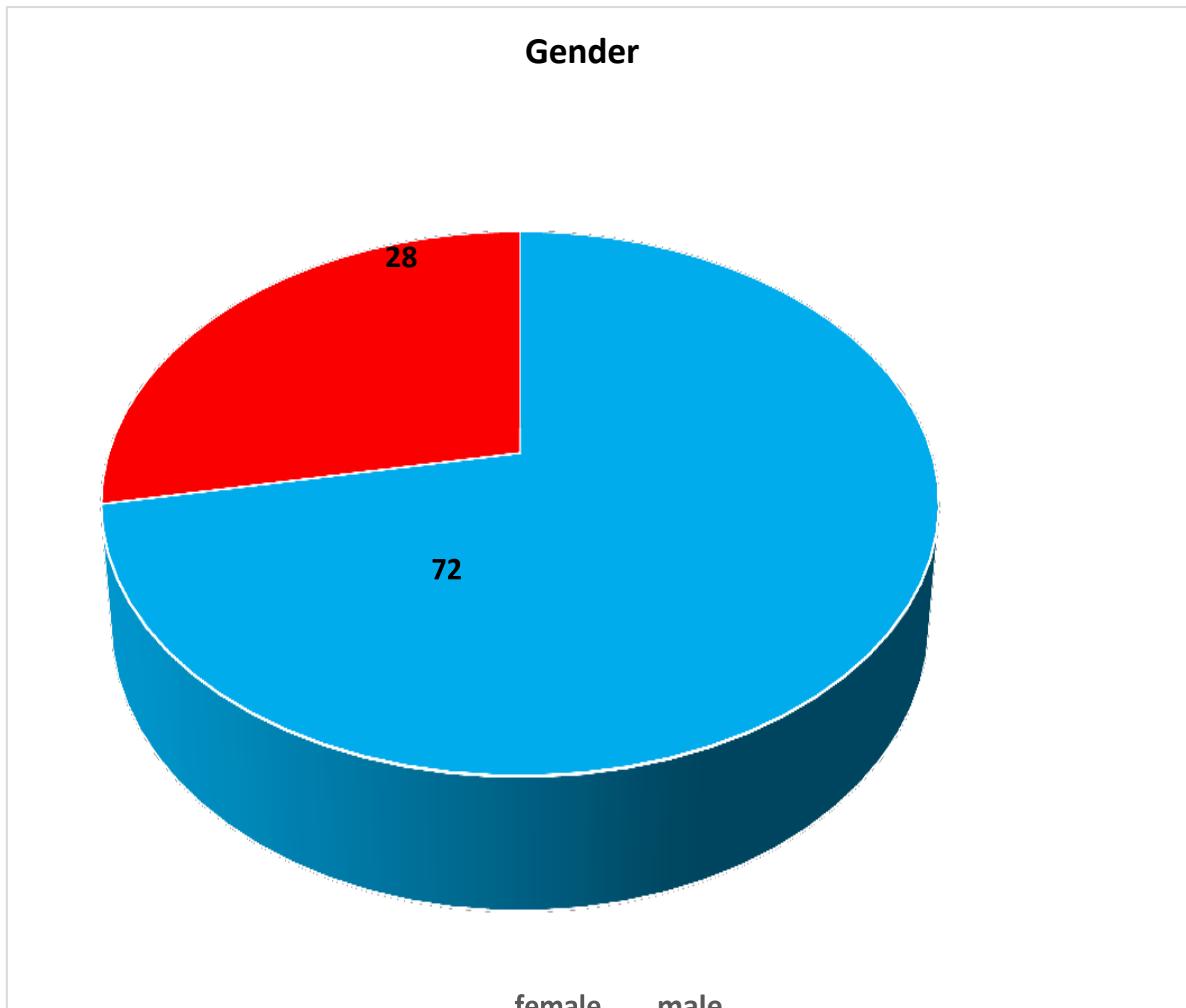


Table 2: Comparison of the scores of pain of patients who were given ketamine and those who were not given ketamine.

		Ketamine		Total	Sig.
		no	yes		
0	0	No.	6	9	15
		%	6%	9%	15%
	1	No.	1	7	8
		%	1%	7%	8%
		No.	6	13	19

Score of pain	2	%	6%	13%	19%	HS
	No.	21	9	30		
	3	%	21%	9%	30%	
	No.	4	7	11		
	4	%	4%	7%	11%	
	No.	0	3	3		
	5	%	0%	3%	3%	
	No.	9	0	9		
	6	%	9%	0%	9%	
	No.	1	2	3		
	7	%	1%	2%	3%	
	No.	2	0	2		
	8	%	2%	0%	2%	
	No.	0	0	0		
	9	%	0%	0%	0%	
	No.	0	0	0		
	10	%	0%	0%	0%	
Total		No.	50	50	100	
		%	50%	50%	100%	

Table 3: Comparison of the scores of pain of male and female patients.

			Gender		Total	Sig.	
			female	male			
Score of pain	0	No.	4	2	6	NS	
		%	8%	4%	12%		
	1	No.	1	1	2		
		%	2%	2%	4%		
	2	No.	5	4	9		
		%	10%	8%	18%		
	3	No.	10	10	20		
		%	20%	20%	40%		
	4	No.	2	3	5		
		%	4%	6%	10%		
	5	No.	0	0	0		
		%	0%	0%	0%		
	6	No.	3	2	5		
		%	6%	4%	10%		
	7	No.	0	1	1		
		%	0%	2%	2%		
	8	No.	0	2	2		
		%	0%	4%	4%		
	9	No.	0	0	0		
		%	0%	0%	0%		
	10	No.	0	0	0		
		%	0%	0%	0%		
Total		No.	25	25	50		
		%	50%	50%	100%		

Table 3: The number of female patients was more than that of male patients in low scores of pain (0,2). But, less of a high score of pain (7,8) means female patients have less score of pain than male patients.

Table 4: Shows the number of male and female patients who were given ketamine and those who were not given ketamine.

		Ketamine		Total	Sig.		
		no	yes				
	female	No.	37	35	72	NS	
		%	37%	35%	72%		
Gender	male	No.	13	15	28		
		%	13%	15%	28%		
Total		No.	50	50	100		
		%	50%	50%	100%		

Table 4: The number of female patients was 72; 35 of them were given ketamine, and 37 of them were not given ketamine. The number of male patients was (28), (15) of them were given ketamine, and (13) of them were not given ketamine.

Table 5: Comparison of the scores of pain of patients who were given ketamine in terms of the type of operation.

		Ketamine	Score of pain										Total	Sig.				
			0	1	2	3	4	5	6	7	8	9	10					
yes	Type of surgery	Appendectomy	No.	1	0	3	3	1	0	0	2	0	0	10	NS			
			%	2%	0%	6%	6%	2%	0%	0%	4%	0%	0%	20%				
		breast mass	No.	1	2	0	0	3	0	0	0	0	0	0	6			
			%	2%	4%	0%	0%	6%	0%	0%	0%	0%	0%	12%				
		curettage	No.	3	2	1	0	0	0	0	0	0	0	0	6			
			%	6%	4%	2%	0%	0%	0%	0%	0%	0%	0%	12%				
		Carpal tunnel syndrome	No.	0	0	2	0	0	0	0	0	0	0	0	2			
			%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	4%				
		Dilation and curettage	No.	0	0	1	1	0	0	0	0	0	0	0	2			
			%	0%	0%	2%	2%	0%	0%	0%	0%	0%	0%	4%				
		fistula	No.	0	0	1	1	0	0	0	0	0	0	0	2			
			%	0%	0%	2%	2%	0%	0%	0%	0%	0%	0%	4%				
		hemorrhoidectomy	No.	1	2	1	0	0	0	0	0	0	0	0	4			
			%	2%	4%	2%	0%	0%	0%	0%	0%	0%	0%	8%				
		hernia	No.	2	0	1	2	2	1	0	0	0	0	0	8			
			%	4%	0%	2%	4%	4%	2%	0%	0%	0%	0%	16%				
		Left leg varicocele	No.	0	0	0	1	0	0	0	0	0	0	0	1			
			%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%				
		left varicocele	No.	0	0	0	0	0	1	0	0	0	0	0	1			
			%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	2%				
		pilonidal sinus	No.	0	0	0	1	0	0	0	0	0	0	0	1			
			%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	2%			
		Remove foreign body	No.	1	0	2	0	0	0	0	0	0	0	0	3			
			%	2%	0%	4%	0%	0%	0%	0%	0%	0%	0%	6.0%				
		stich sinus	No.	0	1	0	0	0	0	0	0	0	0	0	1			
			%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	2%				
		suture of the wound	No.	0	0	1	0	0	0	0	0	0	0	0	1			
			%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	2%				
		vaginal tear	No.	0	0	0	0	0	1	0	0	0	0	0	1			
			%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	2%				
		Varicocele	No.	0	0	0	0	1	0	0	0	0	0	0	1			
			%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	2%				
Total			No.	9	7	13	9	7	3	0	2	0	0	0	50			
			%	18%	14%	26%	18%	14%	6%	0%	4%	0%	0%	0%	100%			

Table 5: Score of pain according to the type of operation in patients who were given ketamine was high in Appendectomy. While was low in breast mass, curettage, carpal tunnel syndrome, Dilation and curettage, Fistula, hemorrhoidectomy, hernia, left leg

varicocele, left varicocele, pilonidal sinus, remove of the foreign body, stich sinus, suture of the wound, vaginal tear, Varicocele.

Table 6: Comparison of the scores of pain of patients who were not given ketamine in terms of the type of operation.

Ketamine			Score of pain										Total	Sig.
			0	1	2	3	4	5	6	7	8	9		
no	Type of surgery	Abscess	No.	0	0	0	1	0	0	0	0	0	0	1
		Abscess	%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	2%
		Appendectomy	No.	1	0	0	1	1	0	1	0	0	0	4
		Appendectomy	%	2%	0%	0%	2%	2%	0%	2%	0%	0%	0%	8%
		axillary mass	No.	0	0	0	1	0	0	0	0	0	0	1
		axillary mass	%	0%	0%	0%	2.0%	0%	0%	0%	0%	0%	0%	2%
		Bartholin	No.	1	0	0	0	0	0	0	0	0	0	1
		Bartholin	%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
		breast mass	No.	0	1	0	7	0	0	1	0	0	0	9
		breast mass	%	0%	2%	0%	14%	0%	0%	2%	0%	0%	0%	18%
		curettage	No.	2	0	1	2	0	0	1	0	0	0	6
		curettage	%	4%	0%	2%	4%	0%	0%	2%	0%	0%	0%	12%
		carpal tunnel syndrome	No.	0	0	0	0	1	0	0	0	0	0	1
		carpal tunnel syndrome	%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	2%
		Dilation and curettage	No.	0	0	0	1	0	0	1	0	0	0	2
		Dilation and curettage	%	0%	0%	0%	2%	0%	0%	2%	0%	0%	0%	4%
		fistula	No.	0	0	1	0	0	0	1	0	0	0	2
		fistula	%	0%	0%	2%	0%	0%	0%	2%	0%	0%	0%	4%
		hemorrhoidectomy	No.	0	0	0	2	0	0	1	0	0	0	3
		hemorrhoidectomy	%	0%	0%	0%	4%	0%	0%	2%	0%	0%	0%	6%
		hernia	No.	0	0	1	3	0	0	0	1	0	0	5
		hernia	%	0%	0%	2%	6%	0%	0%	0%	2%	0%	0%	10%
		hydrocele	No.	0	0	0	0	1	0	0	0	1	0	2
		hydrocele	%	0%	0%	0%	0%	2%	0%	0%	2%	0%	0%	4%
		lipoma in the axillary	No.	0	0	3	2	0	0	1	0	0	0	6
		lipoma in the axillary	%	0%	0%	6%	4%	0%	0%	2%	0%	0%	0%	12%
		pilonidal sinus	No.	0	0	0	1	1	0	1	0	0	0	3
		pilonidal sinus	%	0%	0%	0%	2%	2%	0%	2%	0%	0%	0%	6%
		Subcutaneous cyst removal	No.	2	0	0	0	0	0	0	0	0	0	2
		Subcutaneous cyst removal	%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
		Varicocele	No.	0	0	0	0	0	0	0	0	1	0	1
		Varicocele	%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	2%
		wound department	No.	0	0	0	0	0	0	1	0	0	0	1
		wound department	%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	2%
		Total	No.	6	1	6	21	4	0	9	1	2	0	50
		Total	%	12%	2%	12%	42%	8%	0%	18%	2%	4%	0%	100%

Table 6: Score of pain according to type of operation in patients who were not given ketamine was high in the wound department, pilonidal sinus, lipoma in the axillary, hydrocele, hernia, hemorrhoidectomy, fistula, Dilation and curettage, curettage, breast mass, and Appendectomy. While it was low in subcutaneous cyst removal, carpal tunnel syndrome, Bartholin, axillary mass, and Abscess.

Discussion:

Although the data retrieved on patients administered with ketamine and those not administered with ketamine was statistically analyzed, it was seen that the pain scores differed significantly on both two groups, showing that ketamine is effective in relieving postoperative pain.

The main aim of this study is to illustrate how a low dose of ketamine can influence the level of postoperative pain.

In this research, ketamine has been detected to cause substantial percentages of pain reduction to patients.

It was also observed that there were differences in the levels of postoperative pain between males and females. An examination of the findings of 25 males and 25 females showed that females had lower pain levels compared to their male counterparts.

In patients who took ketamine, the pain levels were high after appendectomy but lower levels were recorded to be after such surgeries as breast mass, curettage, carpal tunnel syndrome, dilation and curettage, fistula repair, hemorrhoidectomy, hernia repair, left leg varicocele, pilonidal sinus treatment, removal of foreign body, stitch sinus treatment, wound suturing, and repair of vaginal tears.

On the other hand, wound procedures, pilonidal sinus treatment, axillary lipoma removal, hernia repair, hemorrhoidectomy, fistula repair, dilation and curettage, breast mass removal, and appendectomy were highest in patients that did not receive ketamine, whereas subcutaneous cyst removal, carpal tunnel syndrome, Bartholin gland procedures, axillary mass removal, and abscess treatment recorded low scores.

The NMDA receptor activation has been believed to be an important event in the development and maintenance of pathological pain states, which include hyperalgesia and allodynia, which is common following nerve and tissue damage. The activation of the spinal NMDA receptors has been confirmed to be a contributor to carrageenan-induced hyperalgesia [12].

The findings are in agreement with Gokcinar et al. (2014), who showed that a low dose of ketamine infused intraoperatively decreases acute postoperative pain after total knee replacement surgery [13].

Hosseinpour et al. (2011) studied preemptive use of ketamine as an analgesic in the management of postoperative pain in patients undergoing appendectomy [14].

Sarao et al. (2015) aimed to examine the effects of the intraoperative low-dose ketamine infusion on postoperative analgesic management [15].

Elia and Tramare (2005) described a quantitative systemic review of randomized trials in relation to ketamine and postoperative pain [16].

Nonetheless, the results of the current study did not align with those reported by Pereira and Pogatzki-Zahn (2015), who dwelled on gender disparities in postoperative pain as it was published in Current Opinion in Anaesthesiology [17].

Conclusion:

Administration of ketamine in low doses (5 mg) decreases postoperative pain in Pediatric patients undergoing general anesthesia for short procedures.

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