

DISCUSSION

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Preoperative anxiety is one real-life paradigm that has been successfully adapted to experimental investigation. In particular, the oral surgery procedure has been utilized extensively for clinical studies and is amenable to testing anxiolytic, sedatives and analgesics.⁽⁷⁰⁾

preoperative psychological preparation and parental presence are beneficial and may reduce the need for pharmacological premedication but sedative premedication has been reported to be more effective than either parental presence or no intervention at all in managing child–parent anxiety during the preoperative period.⁽⁷¹⁾

Inadequate preoperative sedation was clearly linked to anxiety in children and their families surrounding surgical procedures. Even more concerning, those investigators documented that 54% of children undergoing stressful anesthesia induction have postoperative maladaptive behaviors which could be decreased through the use of appropriate sedation.⁽⁷²⁾

The drugs selected in the present study aimed at achieving a state of conscious sedation. It reduces the fear of pain and anxiety associated with parental separation and dental procedures.⁽⁷³⁾ The state of conscious sedation can be achieved through variety of pharmacological agents administered through various routes, but the oral route is usually the most preferred one for pediatric patients. Combinations of drugs have been in practice for a long time, but polypharmacy has its own hazards, so, it was decided in the current study to give all the drugs orally as sole agent. The optimal time interval from premedication until separation from parents should provide maximum sedation and anxiolysis at the time of separation from parents or guardians and at application of a face mask for induction of anesthesia.⁽⁷⁴⁾

The present study was carried out on two groups of children (40 in each group) given oral premedication in the form of syrup 30 min before minor dental surgery under general anesthesia and associated with parental presence in the preoperative holding area. Children in group K were premedicated with a mixture of IV ketamine preparation in juice at a dose of 5mg/Kg, while children in group D were premedicated with dexmedetomidine at a dose of 3 micg/Kg. Children in both groups were separated from their parent at entry to OR.

Sekerci et al⁽⁷⁵⁾ compared oral ketamine 3-6mg/kg given by mouth to premedicate children and suggested that ketamine 3 mg/kg was as effective as 6 mg/ kg with a lower incidence of side-effects such as nystagmus and vomiting.⁽⁷⁵⁾ However, Knox et al⁽⁷⁶⁾ reported the same dose of ketamine, 3 mg /kg, did not always cause sedation or a tranquil separation from the parents.⁽⁷⁶⁾

Zub et al⁽⁷⁷⁾ in studying effective sedation and anxiolysis achieved after 90 min of intranasal dexmedetomidine intake tried two doses of intranasal dexmedetomidine for adequate preoperative sedation and anxiolysis in children. The dose of dexmedetomidine chosen for this study (3 micg/Kg) reflects best dose to achieve a desired level of sedation in a shorter period of time which recommended 3-4 micgm/kg oral dexmedetomidine to reduce anxiety.⁽⁷⁷⁾

In the current study, children's vital signs (HR, MBP and SaO₂%) were recorded before sedation, 30 min after sedation, during the procedure every 15 minute and post-operative every 30 minute. There was a significant difference between the two studied groups regarding children's heart rate noted 30 min after sedation (P value = 0.022), at 0 (P value = 0.023) & 30 min (P value = 0.016). There was no significant difference through rest of the study.

In the present study during the procedure group K, the heart rate significantly increased; may be as a side effect of the drug. Post-operative, the heart rate showed no significant changes till discharge; which may be attributed to loss of the effect of sedation and of general anesthesia. As regards group D, thirty minutes after sedation, the heart rate significantly decreased; this was possibly due to the cardiovascular effect of dexmedetomidine as an alpha 2 agonist. During the procedure, there was no significant change in the heart rate; may be due to self limiting nature of that side effect. Post-operative, the heart rate significantly decreased at 0 and 30 min then showed no significant changes till discharge, the return of HR to baseline level may be attributed to loss of the effect of sedation and of general anesthesia.

There was a significant difference between the two studied groups regarding children's mean arterial blood pressure at 30 min after sedation (P value= 0.017) and at 0 min (P value < 0.001), 30 min (P value =0.002), 60 min (P value = 0.001). There was no significant difference through rest of the study.

In the present study as regards group K Thirty minutes after sedation, the mean arterial blood pressure was significantly increased; this may be because of the sympathetic effect of the drug. During the procedure, the mean arterial blood pressure was significantly increased Post-operative, the mean arterial blood pressure was significantly increased at 0, 30 and 60 min then showed no significant changes till discharge; which may be attributed to loss of the effect of sedation and of general anesthesia. As regards group D, thirty minutes after sedation, the mean arterial blood pressure significantly decreased; this could result from a reduction of sympathetic activity with relief of anxiety or simply from rest. During the procedure, the mean arterial blood pressure significantly decreased; explained by direct cardiovascular effect of the drug. Post-operative, the mean arterial blood pressure was significantly decreased at 0, 30 and 60 min then showed no significant changes till discharge; which may be attributed to loss of the effect of sedation and of GA.

No significant difference between the two studied groups regarding children's oxygen saturation percentage was noted all over the study.

Knox et al⁽⁷⁸⁾ clinical studies on intravenous ketamine showed that the heart rate increases progressively up to 33% for 10–15 min and then subsides.⁽⁷⁸⁾ Gupta et al⁽⁷⁹⁾ studied the role of ketamine as the only anesthetic available with analgesic, hypnotic and amnesic effects and stated that in spite of several advantages, its anesthetic use has been limited due to its cardiostimulant response even in therapeutic doses the net effect is an increase in mean arterial pressure, heart rate and cardiac output, and these results are in agreement with this study.

Yuen et al⁽⁸⁰⁾ study on intranasal dexmedetomidine as premedication in paediatric anaesthesia using dose 3 µg/kg stated that dexmedetomidine is known to decrease sympathetic outflow and circulating catecholamine levels and would therefore be expected to decrease heart rate and mean arterial blood pressure.⁽⁸⁰⁾

Munro et al⁽⁸¹⁾ in a study on hemodynamic and adrenergic effects of perioperative dexmedetomidine infusion after vascular surgery reported that reduction of BP and heart rate were <20% of baseline in children who were sedated with dexmedetomidine followed by a maintenance infusion during cardiac catheterization.⁽⁸¹⁾

Petroz et al⁽⁸²⁾ in a study on oral dexmedetomidine and oral midazolam as a sedative premedication for paediatric patient before surgery showed that 3 µg/kg oral dexmedetomidine produced a significant reduction of heart rate (<15% compared with baseline) and systolic BP (<25% compared with baseline) and these studies results are in agreement with this study.⁽⁸²⁾

In the current study, children's sedation level was better with group D than group K. The increase in ease of separation and ease of venipuncture score system scale and sedative score represents a decrease in sedation level. The observed sedation of children was significantly different between the two groups 30 minutes after premedication with higher sedation level in children premedicated with dexmedetomidine.

In the present study in group K as regard ease of separation and ease of venipuncture; Patients score ranged from 2 to 3 with mean 2.6 ± 0.5 . In group D: as regard ease of separation and ease of venipuncture; Patients score ranged from 1 to 3 with mean 1.63 ± 0.74 .

Humphries et al⁽⁸³⁾ studied the superiority of oral ketamine as an analgesic and sedative for wound care procedures in paediatric patients with burn concluded that oral ketamine produces a characteristic analgesic sedative effect.⁽⁸³⁾

Gutstein et al⁽⁸⁴⁾ studied the effect of oral ketamine as sedative premedication for paediatric patient have concluded that oral ketamine produces a uniform, predictable sedation within 20–25 min of administration and facilitates a calm separation and induction of anesthesia.⁽⁸⁴⁾ And these studies results are in agreement with this study.

Kamal et al⁽⁸⁵⁾ studied the effect of oral dexmedetomidine as premedication in pediatric patients assigned to receive oral dexmedetomidine 3 µg/kg prior to a standardized sevoflurane anesthetic reported its efficacy in producing a smooth separation from the parents and easier inhalation induction⁽⁸⁵⁾

Zub et al⁽⁸⁶⁾ examined anesthesia records to determine the most effective anxiety-reducing anesthesia premedicant for children prior to surgical procedures, recommended 3–4 µg/kg oral dexmedetomidine to reduce anxiety.⁽⁸⁶⁾

Yuen et al⁽⁸⁷⁾ reported that intranasal dexmedetomidine produces more sedation and the behavior of the children at parental separation and at induction of anesthesia with intranasal dexmedetomidine sedation was superior to children who received oral midazolam, and these studies results are in agreement with this study.⁽⁸⁷⁾

On the other hand, Schmidt et al⁽⁸⁸⁾ found no difference in preanesthesia levels of sedation and response to separation from parents between intranasal dexmedetomidine and oral midazolam due to using a smaller dose of dexmedetomidine.⁽⁸⁸⁾

Tobias et al⁽⁸⁹⁾ conducting a clinical study on dexmedetomidine as a premedicant alone found that attempts at intravenous cannulation resulted in difficulties.⁽⁸⁹⁾

Jalowiecki et al⁽⁹⁰⁾ using dexmedetomidine for conscious sedation during outpatient colonoscopy stated that it has a limited role.⁽⁹⁰⁾

Alhashemi et al⁽⁹¹⁾ studied the role of using dexmedetomidine for monitored anaesthesia care during cataract surgery stated the superior role of midazolame.⁽⁹¹⁾

Munro et al⁽⁹²⁾ observed that dexmedetomidine alone appears to be less effective during invasive or potentially painful procedures and resulted in patient movement during femoral arterial puncture in 25% of paediatric patient during cardiac catheterisation.⁽⁹²⁾ But there was no EMLA cream used at any of the previous studies which is the difference from current study.

In the current study, there was no statistically significant difference between two groups as regards recovery time from anesthesia. As regards group K, five (12.5%) patients recovered at 10 min, fourteen (35%) patients at 20 min, twenty one (52.5%) at 30 min. As regards group D, twelve (30%) patients recovered at 10 min, three (7.5%) patients at 20 min, twenty five (62.5%) at 30 min.

In the current study, the discharge time from discontinuation of anesthesia until the patient discharged to home did not differ significantly between the two studied groups. as regards group K : discharge time ranged between 70 and 110min, with a mean of 74.38 ± 10.99 min. As regards group D: discharge time ranged between 75 and 120 min, with a mean of 78.13 ± 8.22 min.

The time to recovery was prolonged in the group given ketamine However, at the end of 2 h spent in the recovery room, there was no significant difference between the two groups.

Tobias et al⁽⁹³⁾ studied the effect of ketamine administered orally to alleviate the distress of invasive procedures in paediatric oncology patients, the majority of patients showed recovery from sedation within 2 h following the procedure and this study results are in agreement with those.⁽⁹³⁾

Schmidt et al⁽⁸⁸⁾ in a clinical study on dexmedetomidine stated that the half-life of dexmedetomidine has been described as two hours and this would likely explain as to why the analgesic sparing properties persisted postoperatively. This interesting characteristic of dexmedetomidine (persistent analgesic effects with preserving the patient arousability) in the postoperative period resulted in significantly more analgesia with equivalent recovery and discharge times and these studies results are in agreement with this study.⁽⁸⁸⁾

Anterograde amnesia was more pronounced for patients of group D in comparison to group K As regards group K; Six patients showed good amnesiac effect (15 %) and thirty four patients showed no amnesiac effect (85%). As regards group D; Twenty seven showed good amnesiac effect (67.5%) and thirteen patients showed no amnesiac effect (32.5%).

The less the child remembers about the perioperative events, the less psychological trauma he or she will experience.⁽⁹⁴⁾

SUMMARY

SUMMARY

Inadequate preoperative sedation was clearly linked to anxiety in children and their families surrounding surgical procedures and stormy induction may be associated with increased emergence delirium.

Dental anxiety represents a specific situational and anticipatory state. Anticipation of dental procedures induces a number of physiological changes characteristic of the anxious state. In children, preanesthetic medications frequently are administered as pharmacologic agents to help alleviate the stress and fear of surgery as well as to ease child-parent separation and promote a smooth induction of anesthesia.

The perfect sedative preanesthesia medication and its ideal route of administration are still debated.

The aim of the present work was to study and compare between orally administered ketamine and orally administered dexmedetomidine in children as a sedative premedication in minor dental surgery under general anesthesia as regards effects on hemodynamic, sedative effect, reaction to separation from the parents, ease of venipuncture, recovery time, discharge time and postoperative amnesia.

The present study was carried out on 80 ASA I pediatric patients scheduled for minor dental surgery under general anesthesia. Their ages ranged from 4 to 6 years. According to the sedative premedication used patients were classified into two equal groups:

Group K: Receiving oral ketamine (5 mg/kg) 30 min before the start of the surgical procedure.

Group D: Receiving oral dexmedetomidine (3 mcg/kg) 30 min before the start of the surgical procedure.

All patients were assessed pre-operatively by detailed history taking, complete clinical examination, airway assessment and routine laboratory investigations. On arrival to the operating room, patients were connected to the standard monitoring; electrocardiograph, non-invasive arterial blood pressure and pulse oximetry. Intravenous cannula was inserted. They were all subjected to the same anesthetic protocol.

Measurements

Vital signs: heart rate (beat/min), mean arterial blood pressure (mmHg) and oxygen saturation (SaO₂%) was recorded as base line (before sedation), before induction of general anesthesia (30 min after sedation), during the procedure every 15 min and post-operative every 30 min till discharge.

Degree of sedation: was assessed after admission to OR (30 min after premedication) using sedative score

Ease of separation and venipuncture: was assessed after admission to OR (30 min after premedication) using Ease of induction score system

The recovery time: was recorded as time required to regain the baseline "Vancouver sedative recovery scale for children" after discontinuation of anesthesia.

The discharge time: was recorded as the time from discontinuation of anesthesia to fulfilling discharge criteria by "The Short-Stay Surgery Discharge Score".

The anterograde amnesia: was assessed after 24 hours by a recall questionnaire of the parents.

The result of the present study showed that:

- There was no statistically significant difference between both groups as regards age, gender distribution, duration of operation, and weight.
- There was statistically significant difference between both groups as regards vital signs throughout the study.
- There was a statistically significant difference between heart rate in the two groups at 30 min after sedation and post-operatively at 0 and 30 min
- There was a statistically significant difference between mean arterial blood pressure between the two groups at 30 min after sedation and post operatively at 0, 30 and 60 min.
- There was no statistically significant difference between two groups in oxygen saturation all over the study
- The degree of sedation was significantly higher in group D than group K.
- The ease of separation and venipuncture was significantly higher with group D than group K.
- There was no statistically significant difference between both groups as regards recovery time and the discharge time.
- The anterograde amnesia was significantly better with group D than group K.

CONCLUSIONS

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From the present study, the following can be concluded:

1. Both oral ketamine and oral dexmedetomidine can be used as a premedication for children before induction of general anaesthesia.
2. Oral dexmedetomidine premedication when used alone is a reliable anxiolytic and sedative modality increasing child's cooperation without need of further behavioral intervention techniques
3. Oral ketamine premedication 30 min before surgery at a dose of 5 mg/Kg has limited anxiolytic and amnestic effects.
4. Alteration in pulse rate, blood pressure, oxygen saturation and respiratory rate were within physiological limits and no adverse reactions were observed in any patient in both groups.