

# Oral midazolam: Preanaesthetic medication in children, a dose finding study

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## Abstract

**Background:** Pediatric patients are always challenging in anaesthesia and surgery. Premedication and adequate sedation of children before they enter in Operation Theater is of significant importance for smooth induction and reducing the mental trauma of getting separated from parents. It will help in reducing sensory inputs, metabolic rate and will antagonize adverse reaction of autonomic nervous system. **Methods:** Randomly selected 104 patients from age group 3 years to 10 years posted for surgeries with ASA grade I and II were included in study. Exclusion criteria were babies on anticonvulsant, known allergic children, and babies having history of systemic diseases. All basic investigations were noted, the weight was noted and patients accepted only when the routine investigations were in within normal limits. Written valid informed consent was obtained from parents or legal guardians. Three groups were made. Group A) placebo and Atropine 0.03mg/kg, Group B) Midazolam 0.25 mg /kg and Atropine 0.03mg/kg, Group C) Midazolam 0.50mg/kg and Atropine 0.03mg/kg was given orally 30 min before the induction of anaesthesia. The study solution was prepared in 3ml of 25% Dextrose immediately prior to administration. The anaesthetic management was similar in all groups. The analysis of data was carried out by using Chi-square test, standard deviation. **Results:** The patient's level of sedation, separation from parents, and quality of induction (mask acceptance) was statistically significant which was very good to excellent in group 3, and post operative behavior, time spent in recovery room and time of waking was almost same in all groups. From this it was clear that the oral Midazolam in minimal dose of 0.50mg/kg is having very good anxiolysis in children at least 30 mins prior to induction of anaesthesia. **Conclusions:** We conclude that the oral premedication with Midazolam at a dose of 0.50 mg /kg at least 30 mins prior of induction provide excellent baby sedation and reduce the mental trauma of child of being get separated from parents and make ease of anaesthesia induction.

**Keywords:** Oral Midazolam, Preanaesthetic medication, Children.

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## INTRODUCTION

Pediatric surgery is major challenge to the anaesthesiologist. These patients are uncooperative and difficult to treat. Behavioral management alone unfortunately is not sufficient for many children. Kids are afraid of needles prick. A calm and quite child is always a good patient for induction of anaesthesia, as anaesthetic

induction in uncooperative child is associated with Oxygen desaturation due to crying and breath holding .Post operative behavioral problems can be avoided by minimizing mental trauma with premedication. (Craig Weldon 92). Cote (1982) has shown that unpremedicated kids are at significant risk of vomiting and aspiration of gastric content. Opioids are in use for this but it causes significant respiratory depression and post operative sedation. And other problems like bronchospasm, delay gastric emptying and urinary retention (Madej 87).Oral route is the best suited route for kids for sedation. Parental Midazolam is very good sedative and anxiolytic agent.

## AIMS AND OBJECTIVE

To study efficacy of the oral Midazolam, assess acceptability of oral Midazolam, optimum effective dose, safety of oral Midazolam and postoperative behavior of children.

## METHODS

One hundred and four children were included in study of either sex, between age group 3years to 10 years with weight of 17 +/- 5kg. The surgical procedure s with expected duration of 45min to 1 hour was included in study like hernia, hydrocele, cystolithotomy etc. Written valid informed consent was obtained from parents or legal guardian. Exclusion criteria were anticonvulsant treatment, known sensitivity to benzodiazepines, upper GI pathology, asthma patients, hepatic, cardiac, renal or hematological diseases and developmental anomalies. Patients were randomly allocated in three different groups, A) placebo and 0.03/mg Atropine, Group B) Midazolam 0.25mg/kg and 0.03mg/kg Atropine, Group C) Midazolam 0.50mg/kg and Atropine 0.03mg/kg was given orally 30 min before the induction of anaesthesia. The study solution was prepared in 3ml of 25% Dextrose immediately prior to administration. The acceptability of oral preparation was noted as accept it readily, with grimace or complaint, rejected entirely. Level of sedation was assessed at every 15 mins according to four category behavioral scale i.e. 1) Asleep, 2) Awake and calm, 3) Awake and anxious, and 4)Crying. Score 1 and 2 were considered as satisfactory and 3 and 4 as unsatisfactory level of sedation (C. Waldon 92). Children were separated from their parents after a period of at least 30 mins of premedication. At the time child's willingness to separate from parents were noted as 1) Easy separation, 2) Whimpers but easily reassured not clinging to parents, 3) Cried and not easily reassured, 4) Crying and clinging to parents. Score 1 and 2 is satisfactory separation and 3 and 4 is unsatisfactory separation. After entering in Operation Theater and securing the IV line, the anaesthesia was induced with oxygen and nitrous oxide mask with gradually increasing Halothane from 0.5 to 2.5% with Dragger vaporizer. The quality of induction was assessed as 1)Excellent i.e. co-operative child accept mask easily,2) Good i.e. slight fear of mask but easily reassured, 3) Fair i.e. moderate fear of mask , not calmed with reassurance,4) Poor i.e. terrified , crying and combative child. Score 1 and 2 is satisfactory acceptance of mask and 3 and 4 is unsatisfactory acceptance of mask.

Anesthetic management was similar in all cases. After recovery from anaesthesia pts were transferred to recovery room and behavioral assessment was done at 0,10, 20 and 30 mins after arrival in PICU using same scale i.e. Asleep, Awake and calm, Awake and anxious and Crying babies. Time of waking was recorded as time to first response recovery room recorded.

## Statistical Analysis

Results are given as mean +/- SD. Total 104 patients included in study. Data within the groups was analyzed using paired *t*- test, and between the groups by using unpaired *t*-test. Value of  $P < 0.05$  is considered as significant in this study. Chi-square test has been used to identify the difference between two proportions. Mean age of patients was 6+/- 2 years average and is comparable in all three groups i.e.  $P > 0.05$ , mean body weight was also comparable 18.4 +/- 4 Kg ( $P > 0.05$ ) duration between premedication and induction of anaesthesia was also comparable 35+/- 9 mins ( $P > 0.05$ ) Anxiety level before premedication was almost same  $\chi^2_2 = 1.6385$  and  $P > 0.05$ . The acceptance of drug was comparable. I.e.  $\chi^2_2 = 0.3991$  AND  $p > 0.05$

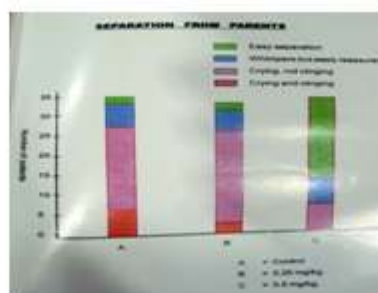
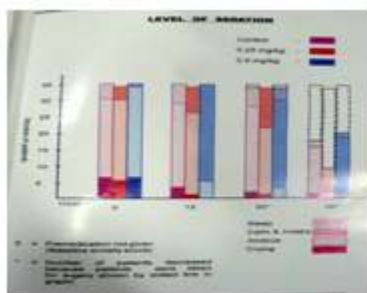
## RESULTS

The level of sedation, separation from parents and acceptance of mask in group A and B was comparable i.e.  $P > 0.05$ , but all the three parameters were significantly good to excellent in group C as compared with group A and group B i.e.  $P < 0.05$ . The post operative recovery, and stay in PICU was comparable in all groups i.e.  $P > 0.05$ .

Table 1: Acceptability of Drug

Acceptance	A (n=35)	B (n=34)	C (n=35)
Excellent	2 (5.71%)	3 (8.82%)	4 (11.42%)
Good	27 (77.14%)	27 (79.41%)	25 (71.42%)
Poor	6 (17.14%)	4 (2.94%)	6 (17.14%)
	$\chi^2_2 = 0.3991$	$P > 0.05$	

The data shows there was no statistically significant difference in the acceptance of drug in the three groups.



**Table 2:** Quality of induction (Mask acceptance)

Quality	A (n=35)	B (n=34)	C (n=35)
Excellent	-	2 (5.88%)	17 (48.57%)
Good	12 (34.28%)	9 (26.47%)	15 (42.85%)
Poor	23 (65.71%)	23 (67.64%)	3 (8.57%)

A Vs B: P>0.05; A Vs C : P>0.05; B Vs C: P>0.05

This table shows statically high significant difference in the quality of induction which was excellent in group 'C' as compared with group 'A' and also when compared with group 'B'

## DISCUSSION

A clam and relax baby is welcome patient for an anesthesiologist in operation theater. This will reduce the time and the unnecessary stress in inducing the children. This will definitely helpful in smooth induction of anaesthesia, as a crying, terrified child is real nightmare for anaesthesiologists. Chances of breath holding, desaturation and vomiting are high if a child cries and fights a lot. Although several studies documented the effectiveness of oral midazolam, but the optimal dose for preoperative sedation and anxiolysis was unclear. Feld *et al.* found three doses of oral Midazolam i.e. 0.25, 0.50 and 0.75mg/kg were equally effective, but separation from parents was excellent in only 10% children. Mc Millan used higher doses i.e. 0.75 and 1mg/kg but he found loss of head control and balance in few patients. As kids are very afraid of needles and other routes like intranasal and rectal are not well tolerated by the kids, the most reliable and effective route i.e. oral route was selected here. The bitter test of the IV preparations (Ampoule 5mg/ml) is tried to overcome by mixing it with 3 ml of 25% of Dextrose and to reduce the secretions, oral atropine 0.03mg/kg was mixed with it. Some investigators mix the drug with juice. The palatability was very good in this study, level of sedation after 30 min, separation from parents and the acceptance of the mask was excellent in group C i.e. 0.50mg/kg dose as compared to two other groups. Postoperative complications like nausea and vomiting, excessive sedation and the average time spent in the recovery room was comparable in all the groups.

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