



Received on 27 June 2026; received in revised form, 10 July 2026; accepted, 25 July 2026; published 01 November 2026

COMPARISON OF DEXMEDETOMIDINE PROPOFOL AND FENTANYL PROPOFOL SEDATION FOR PEDIATRIC COLONOSCOPY: AN OBSERVATIONAL COMPARATIVE STUDY

Shantanu Kulkarni, Kshitija Mahajan, Vijay Komulwar and Anuja Patil *

Lokmanya Tilak Municipal General Hospital and Lokmanya Tilak Municipal Medical College, Mumbai - 400022, Maharashtra, India.

Keywords:

Pediatric colonoscopy,
Dexmedetomidine, Propofol,
Fentanyl, Procedural sedation,
Monitored anesthesia care

Correspondence to Author:

Dr Anuja Patil

Senior Resident,
Lokmanya Tilak Municipal General
Hospital and Lokmanya Tilak
Municipal Medical College, Mumbai -
400022, Maharashtra, India.

E-mail: itsanu1195@gmail.com

ABSTRACT: Background: Colonoscopy is an essential diagnostic and therapeutic procedure in pediatric gastroenterology, requiring effective procedural sedation to ensure patient comfort, procedural success, and safety. Dexmedetomidine has emerged as a promising adjunct to propofol because of its sedative and analgesic properties with minimal respiratory depression. However, comparative evidence between dexmedetomidine-propofol and fentanyl-propofol for pediatric colonoscopy remains limited. **Objective:** To compare the efficacy and safety of dexmedetomidine-propofol and fentanyl-propofol combinations for monitored anesthesia care in children undergoing elective colonoscopy. **Methods:** This study included 64 children (2–12 years; ASA physical status I–II) undergoing elective colonoscopy. Thirty-two patients received dexmedetomidine-propofol (Group D) and thirty-two received fentanyl-propofol (Group F). The primary outcome was post-procedural pain assessed using the Visual Analog Scale (VAS). Secondary outcomes included hemodynamic parameters, total propofol consumption, recovery time based on the Modified Aldrete Score, colonoscopist satisfaction, and adverse events. **Results:** Baseline demographic and procedural characteristics were comparable between the groups. Group D demonstrated significantly lower post-procedural pain scores than Group F ($\chi^2 = 7.929$, $P = 0.019$). Mean total propofol consumption was lower in Group D (135.94 ± 46.13 mg) than in Group F (151.25 ± 48.17 mg), although the difference was not statistically significant ($P = 0.199$). Recovery time was comparable between the groups (18.59 ± 4.04 vs. 20.13 ± 5.05 min; $P = 0.185$). Hemodynamic parameters and oxygen saturation remained clinically stable throughout the procedure. Colonoscopist satisfaction was similar in both groups ($P = 0.193$). No clinically significant sedation-related adverse events were observed. **Conclusion:** Dexmedetomidine-propofol provided superior post-procedural analgesia while maintaining comparable sedation quality, hemodynamic stability, recovery characteristics, and procedural safety compared with fentanyl-propofol. Dexmedetomidine may represent an effective opioid-sparing adjunct for monitored anesthesia care during pediatric colonoscopy.

INTRODUCTION: Colonoscopy is an indispensable diagnostic and therapeutic procedure in pediatric gastroenterology, enabling the

evaluation and management of inflammatory bowel disease, chronic diarrhea, lower gastrointestinal bleeding, colorectal polyps, chronic abdominal pain, and other colonic disorders.

Successful completion of colonoscopy in children often requires procedural sedation because anxiety, fear, poor cooperation, and pain may compromise both patient safety and procedural quality. Appropriate sedation not only facilitates successful

<p>QUICK RESPONSE CODE</p> 	<p>DOI: 10.13040/IJPSR.0975-8232.17(11).3567-75</p>
<p>This article can be accessed online on www.ijpsr.com</p>	
<p>DOI link: https://doi.org/10.13040/IJPSR.0975-8232.17(11).3567-75</p>	

endoscopy but also minimizes psychological stress, improves patient and parent satisfaction, and enhances procedural efficiency¹.

An ideal sedative regimen for pediatric colonoscopy should provide adequate hypnosis, analgesia, and anxiolysis while preserving spontaneous ventilation, maintaining cardiovascular stability, and allowing rapid recovery suitable for ambulatory procedures. Although several sedative agents are available, no single drug fulfills all these characteristics. Consequently, balanced sedation using combinations of sedative and analgesic agents has become the preferred approach for pediatric gastrointestinal endoscopy^{1,2}.

Propofol is currently one of the most commonly used intravenous sedative agents because of its rapid onset, short duration of action, easy titration, and favorable recovery profile. However, propofol possesses minimal intrinsic analgesic activity and exhibits dose-dependent respiratory depression and hypotension, particularly when administered in higher doses or in combination with opioids. Fentanyl is therefore frequently used as an adjunct because of its rapid onset and potent analgesic properties. Nevertheless, opioid-based sedation may increase the risk of respiratory depression, apnea, postoperative nausea and vomiting, and delayed recovery, particularly in pediatric patients, necessitating close cardiorespiratory monitoring throughout the procedure².

Dexmedetomidine is a highly selective α_2 -adrenergic receptor agonist that produces sedation, anxiolysis, and analgesia by reducing central sympathetic outflow. Unlike opioids and benzodiazepines, dexmedetomidine produces a unique state of cooperative sedation resembling natural sleep while largely preserving spontaneous ventilation and airway reflexes. Because of these pharmacological characteristics, dexmedetomidine has emerged as an attractive adjunct for pediatric procedural sedation, particularly during gastrointestinal endoscopy where maintenance of respiratory function is of paramount importance. A recent systematic review by O'Kane *et al.* concluded that dexmedetomidine demonstrates predictable pharmacokinetics and pharmacodynamics across pediatric age groups and

provides effective sedation with an acceptable safety profile when administered using appropriate dosing regimens³.

The growing evidence supporting dexmedetomidine has been reinforced by recent systematic reviews and meta-analyses. Nie *et al.*, in a meta-analysis including 859 pediatric patients, demonstrated that dexmedetomidine-based sedation significantly improved procedural success and significantly reduced the incidence of nausea and vomiting without prolonging recovery time⁴. Similarly, Hamdan *et al.*, in a comprehensive systematic review and meta-analysis, reported that dexmedetomidine-containing regimens were associated with a high probability of successful procedural sedation while maintaining an acceptable safety profile across a wide variety of pediatric procedures⁵. These findings support the increasing use of dexmedetomidine as part of opioid-sparing sedation strategies in children.

Several randomized clinical trials have compared dexmedetomidine-based sedation with conventional propofol-based regimens during endoscopic procedures. Mason *et al.* demonstrated that the addition of dexmedetomidine significantly reduced propofol consumption during pediatric deep sedation, while also shortening post-anesthesia care unit discharge time⁶. Seyam *et al.* reported that dexmedetomidine provided superior analgesia, lower pain scores, improved cardiorespiratory stability, and fewer respiratory adverse events than propofol-fentanyl during colonoscopy⁷. Similarly, Kavousi *et al.* observed lower intra-procedural heart rates, improved patient comfort, and fewer respiratory complications with dexmedetomidine-containing sedation compared with propofol-fentanyl during colonoscopy⁸. In pediatric lower gastrointestinal endoscopy, Nisar *et al.* demonstrated superior procedural conditions, reduced rescue propofol requirements, shorter recovery time, and improved recovery profiles with dexmedetomidine-propofol compared with fentanyl-propofol⁹. Karanth *et al.* also reported that dexmedetomidine provided effective conscious sedation with satisfactory procedural conditions comparable to propofol while maintaining an acceptable safety profile during outpatient colonoscopy¹⁰.

Despite these encouraging findings, direct comparative evidence evaluating dexmedetomidine-propofol and fentanyl-propofol combinations specifically in pediatric colonoscopy remains limited, particularly from resource-limited settings where sedation practices frequently depend on institutional protocols and available expertise. Furthermore, relatively few studies have simultaneously evaluated analgesic efficacy, sedative requirements, hemodynamic responses, recovery characteristics, colonoscopist satisfaction, and procedure-related adverse events within the same pediatric population. Therefore, the present prospective observational comparative study was undertaken to evaluate and compare the efficacy and safety of dexmedetomidine-propofol and fentanyl-propofol combinations for monitored anesthesia care in children undergoing elective colonoscopy.

MATERIALS AND METHODS: This prospective observational comparative study was conducted in the endoscopy procedure room of a tertiary care center over a period of two years from January 2018 to December 2019, after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from the parents or guardians of all patients. The study was prospectively registered with the Clinical Trials Registry-India (CTRI No. CTRI/2019/11/022101). The choice of sedation regimen (dexmedetomidine-propofol or fentanyl-propofol) was determined by the attending consultant anesthesiologist according to routine institutional practice before patient enrolment. Consecutive eligible patients were included to minimize selection bias, and the study is reported in accordance with the STROBE guidelines for observational studies.

Children aged 2–12 years with American Society of Anesthesiologists (ASA) physical status I or II scheduled for elective colonoscopy under monitored anesthesia care were screened for eligibility.

Inclusion criteria:

- Children aged 2–12 years.
- ASA physical status I or II.
- Scheduled for elective diagnostic or therapeutic colonoscopy.

- Adequate bowel preparation.
- Written informed parental consent.

Exclusion criteria:

- Known hypersensitivity to dexmedetomidine, fentanyl, or propofol.
- Congenital or acquired significant cardiac disease.
- Baseline bradycardia or atrioventricular conduction abnormalities.
- Hepatic or renal dysfunction.
- Neurological disorders affecting sedation assessment.
- Anticipated difficult airway or craniofacial anomalies.
- Obstructive sleep apnea.
- Severe obesity (BMI >95th percentile for age).
- Active respiratory tract infection.
- Requirement for emergency colonoscopy.
- Previous sedative or opioid administration within 24 hours before the procedure.

The sample size was calculated using the primary outcome variable, namely post-procedural pain assessed by the Visual Analog Scale (VAS). Based on the difference in analgesic outcomes reported by Nisar *et al.*⁹, a two-sided significance level (α) of 0.05, a study power of 80% ($\beta = 0.20$), and an allocation ratio of 1:1 were assumed. The minimum required sample size was estimated to be 32 patients in each group. Therefore, a total of 64 children were included in the study.

Pre-procedure Preparation: All children underwent standard pre-anesthetic evaluation one day before the procedure. Fasting was maintained according to ASA fasting recommendations.

Bowel preparation was performed according to the institutional pediatric gastroenterology protocol.

Sedation Protocol: All procedures were performed in the endoscopy suite under the supervision of a consultant anesthesiologist who remained present throughout the procedure.

Standard monitoring included:

- Electrocardiography
- Non-invasive blood pressure
- Pulse oximetry
- Heart rate
- Respiratory rate

Baseline values were recorded before administration of study drugs.

Dexmedetomidine–Propofol Group: Patients received dexmedetomidine 1 µg/kg intravenously over 10 minutes followed by propofol 1 mg/kg IV.

Fentanyl–Propofol Group: Patients received fentanyl 1 µg/kg intravenously followed by propofol 1 mg/kg IV.

Hemodynamic parameters including heart rate, systolic blood pressure, diastolic blood pressure, and oxygen saturation were recorded at baseline, after induction, and at 5-minute intervals until completion of the procedure.

Additional boluses of propofol were administered as required to maintain adequate sedation, targeting a Ramsay Sedation Score (RSS) of 4–5¹¹. Analgesic efficacy was assessed using the Visual Analogue Scale (VAS)¹². 7 For children of age <7 years were assessed by using FLACC scale^{13,14}.

Supplemental oxygen was administered throughout the procedure.

Airway equipment, suction apparatus, bag-mask ventilation, emergency medications, and pediatric resuscitation equipment were immediately available in accordance with institutional policy.

All patients received polyethylene glycol (PEG)-based bowel preparation according to the

institutional pediatric gastroenterology protocol. PEG remains the preferred bowel cleansing agent in children because of its established efficacy and safety. Randomized controlled trials have demonstrated that split-dose PEG provides significantly better bowel cleansing quality and patient tolerability than single-dose administration, while low-volume PEG preparations and oral sulfate solution have shown comparable efficacy in children and adolescents¹⁵⁻¹⁷.

Recovery time was defined as the interval between discontinuation of sedation and achievement of a Modified Aldrete Score ≥9.

Colonoscopist satisfaction was graded as Excellent, Good, Poor.

Safety Assessment: Patients were continuously observed for adverse events including Bradycardia, Hypotension, Oxygen desaturation (SpO₂ <94%), Apnea, Airway obstruction, Requirement of airway intervention, Nausea and Vomiting.

All adverse events were managed according to standard institutional protocols.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) or median (interquartile range) depending on data distribution. Categorical variables were presented as frequencies and percentages. Normality was assessed using the Shapiro–Wilk test. Comparisons between groups were performed using Independent Student's t-test for normally distributed continuous variables. Mann–Whitney U test for non-normally distributed variables. Chi-square test or Fisher's exact test for categorical variables. A two-tailed P value <0.05 was considered statistically significant.

RESULTS:

TABLE 1: BASELINE DEMOGRAPHIC AND PROCEDURAL CHARACTERISTICS

Variable	Dexmedetomidine + Propofol (n = 32)	Fentanyl + Propofol (n = 32)	P-value
Age (years)	10.34 ± 2.78	9.91 ± 2.69	NS
Weight (kg)	26.25 ± 7.72	25.59 ± 7.70	NS
Male, n (%)	19 (59.4)	17 (53.1)	NS
Female, n (%)	13 (40.6)	15 (46.9)	NS
Duration of colonoscopy (min)	37.81 ± 10.23	35.00 ± 11.50	0.305

The mean age was 10.34 ± 2.78 years in Group D and 9.91 ± 2.69 years in Group F. Male children constituted 59.4% of Group D and 53.1% of Group F. Mean body weight was 26.25 ± 7.72 kg in Group D and 25.59 ± 7.70 kg in Group F.

The mean duration of colonoscopy was 37.81 ± 10.23 minutes in the dexmedetomidine group and 35.00 ± 11.50 minutes in the fentanyl group, with no statistically significant difference ($P = 0.305$).

TABLE 2: VISUAL ANALOG SCALE (VAS) PAIN SCORE AFTER RECOVERY

VAS score	Dexmedetomidine + Propofol n (%)	Fentanyl + Propofol n (%)
0	7 (21.9)	0 (0)
1	18 (56.3)	22 (68.8)
2	7 (21.9)	10 (31.2)

Post-procedure pain was assessed using the Visual Analog Scale (VAS) after recovery. A VAS score of 0 was observed in 7 patients (21.9%) in the dexmedetomidine group, whereas none of the patients in the fentanyl group achieved a VAS score of 0. VAS scores of 1 were recorded in 18 patients (56.3%) in Group D and 22 patients (68.8%) in Group F, while VAS scores of 2 were

observed in 7 patients (21.9%) and 10 patients (31.2%), respectively.

The difference in pain scores between the groups was statistically significant ($\chi^2 = 7.929$, $P = 0.019$), indicating superior post-procedural analgesia in the dexmedetomidine-propofol group.

TABLE 3: HEMODYNAMIC PARAMETERS

	Dexmedetomidine + Propofol	Fentanyl + Propofol	p-value
Heart rate (beats/min)			
Baseline	104.34 ± 15.91	106.59 ± 17.33	0.590
15 min	94.03 ± 14.10	96.68 ± 16.39	0.494
30 min	87.10 ± 10.28	91.52 ± 12.48	0.153
Blood Pressure			
SBP Baseline	103.75 ± 11.60	106.25 ± 10.71	0.374
SBP 30 min	92.72 ± 6.42	98.89 ± 6.10	0.001
DBP Baseline	67.03 ± 9.24	70.81 ± 11.51	0.152
DBP 30 min	57.69 ± 4.91	63.33 ± 9.00	0.005
Oxygen Saturation (SpO ₂)			
Baseline	99.78 ± 0.42	99.78 ± 0.42	0.789
Throughout procedure	Stable	Stable	NS

Baseline heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), and oxygen saturation (SpO₂) were comparable between the two groups. Heart rate gradually decreased during the procedure in both groups without clinically significant bradycardia. Similarly, SBP and DBP demonstrated a gradual decline during colonoscopy. Although statistically significant differences were observed at isolated time points for SBP (25 and 35 minutes) and DBP (15–30

minutes), these changes were not considered clinically significant. No patient required pharmacological intervention for hypotension or bradycardia.

Mean baseline SpO₂ was $99.78 \pm 0.42\%$ in both groups. Oxygen saturation remained above 99% throughout the procedure, and no statistically significant intergroup differences were observed at any time point ($P > 0.05$).

TABLE 4: PROPOFOL CONSUMPTION AND RECOVERY CHARACTERISTICS

Variable	Dexmedetomidine + Propofol (n = 32)	Fentanyl + Propofol (n = 32)	P-value
Rescue (top-up) propofol (mg)	6.78 ± 2.46	6.66 ± 3.17	0.861
Total propofol dose (mg)	135.94 ± 46.13	151.25 ± 48.17	0.199
Recovery time (min)*	18.59 ± 4.04	20.13 ± 5.05	0.185

The mean rescue (top-up) propofol requirement was 6.78 ± 2.46 mg in Group D and 6.66 ± 3.17 mg

in Group F, with no statistically significant difference ($P = 0.861$).The mean total propofol

dose required during colonoscopy was 135.94 ± 46.13 mg in the dexmedetomidine group compared with 151.25 ± 48.17 mg in the fentanyl group. Although propofol consumption was numerically lower in the dexmedetomidine group, the difference was not statistically significant ($P =$

0.199). Recovery time, defined as the interval required to achieve a Modified Aldrete Score ≥ 9 , was 18.59 ± 4.04 minutes in Group D and 20.13 ± 5.05 minutes in Group F, with no statistically significant difference ($P = 0.185$).

TABLE 5: COLONOSCOPIST SATISFACTION

Satisfaction	Dexmedetomidine + Propofol n (%)	Fentanyl + Propofol n (%)
Excellent	23 (71.9)	18 (56.3)
Good	9 (28.1)	14 (43.7)
Poor	0	0

Colonoscopist satisfaction was rated as excellent in 23 patients (71.9%) in the dexmedetomidine group and 18 patients (56.3%) in the fentanyl group. The remaining procedures were graded as good (9 patients [28.1%] vs 14 patients [43.8%], respectively). No procedure was rated as poor.

Although a greater proportion of procedures were graded as excellent in the dexmedetomidine group, the difference between the two groups was not statistically significant ($\chi^2 = 1.697$, $P = 0.193$).

Adverse Events: No adverse events were observed in either group. There were no episodes of hypoxia, hypotension, hypertension, arrhythmia, coughing, vomiting, shivering, or any other sedation-related complications during the study period.

DISCUSSION: The present study demonstrated that dexmedetomidine–propofol provided superior post-procedural analgesia while maintaining comparable hemodynamic stability, recovery profile, colonoscopist satisfaction and safety compared with fentanyl–propofol.

Adequate procedural sedation remains fundamental to successful pediatric gastrointestinal endoscopy because it reduces procedural anxiety, improves patient cooperation, facilitates completion of technically demanding procedures, and minimizes procedure-related complications¹. Recent systematic reviews have reinforced the role of dexmedetomidine as a valuable sedative adjunct owing to its favorable pharmacokinetic profile, preservation of spontaneous ventilation, and predictable recovery characteristics³⁻⁵.

The most important observation in the present study was the significantly lower post-procedural pain scores in children receiving dexmedetomidine

propofol. A VAS score of zero was achieved in 21.9% of patients in the dexmedetomidine group, whereas none of the children receiving fentanyl–propofol were completely pain free after the procedure. Furthermore, only 21.9% of children in the dexmedetomidine group reported a VAS score of 2 compared with 31.2% in the fentanyl group ($\chi^2 = 7.929$, $P = 0.019$). The superior analgesic efficacy observed with dexmedetomidine is consistent with its mechanism of action through central α_2 -adrenoceptor activation, which inhibits nociceptive transmission and attenuates sympathetic responses.

Our findings are comparable with those of Seyam *et al.*, who reported significantly lower pain scores together with improved cardiorespiratory stability in patients receiving dexmedetomidine during colonoscopy compared with propofol–fentanyl sedation⁷. Similarly, Kavousi *et al.* demonstrated superior analgesia and improved patient comfort with dexmedetomidine-containing sedation during colonoscopy while maintaining satisfactory procedural conditions⁸. In one of the few pediatric randomized studies, Nisar *et al.* also reported better procedural analgesia and smoother recovery with dexmedetomidine–propofol than with fentanyl–propofol during lower gastrointestinal endoscopy⁹. Collectively, these studies support the analgesic advantage observed in the present study and reinforce the role of dexmedetomidine as an opioid-sparing adjunct for pediatric endoscopic procedures.

The mean total propofol requirement in the present study was lower in the dexmedetomidine group (135.94 ± 46.13 mg) than in the fentanyl group (151.25 ± 48.17 mg), although the difference was not statistically significant ($P = 0.199$). Despite the lack of statistical significance, the observed trend is

clinically relevant because dexmedetomidine is known to exert a propofol-sparing effect. Mason et al. demonstrated a significant reduction in propofol requirement during pediatric deep sedation, reporting a median propofol infusion rate of 0.23 mg/kg/min in the dexmedetomidine group compared with 0.40 mg/kg/min in the propofol-only group ($P = 0.0004$)⁶. Likewise, Nisar et al. observed significantly fewer rescue propofol boluses in children receiving dexmedetomidine than fentanyl (1.84 ± 0.76 vs. 3.72 ± 1.16 ; $P < 0.0001$)⁹. The discrepancy between these findings and the present study is likely attributable to differences in study design, comparator regimen, and sample size. Unlike the study by Mason et al., which compared dexmedetomidine with propofol alone, our study used fentanyl as the comparator, an analgesic that itself reduces propofol requirements. In addition, individualized propofol titration in an observational setting and the relatively small sample size may have reduced the ability to detect statistically significant differences.

Both sedation regimens provided satisfactory procedural sedation, as reflected by comparable Ramsay Sedation Scores throughout colonoscopy. This observation indicates that dexmedetomidine achieved an adequate depth of sedation comparable with fentanyl without compromising procedural conditions. Karanth et al. similarly reported that dexmedetomidine provided effective conscious sedation comparable with propofol during outpatient colonoscopy, with satisfactory procedural conditions and acceptable safety¹⁰. Earlier, Dere et al. demonstrated improved sedation quality, pain control, and hemodynamic stability with dexmedetomidine compared with midazolam during colonoscopy, further supporting its utility in endoscopic procedures¹⁸.

Heart rate and blood pressure gradually declined during colonoscopy in both groups, with a greater reduction observed in the dexmedetomidine group. However, these changes remained within clinically acceptable limits, and no patient required pharmacological treatment for bradycardia or hypotension. The observed hemodynamic profile is consistent with the sympatholytic effects of dexmedetomidine and agrees with previous reports. Kavousi et al. reported significantly lower intra-procedural heart rates in patients receiving

dexmedetomidine (72.51 ± 16.70 beats/min) compared with propofol-based sedation (81.56 ± 15.71 beats/min; $P = 0.001$), without clinically important cardiovascular instability⁸. Seyam et al. likewise observed lower heart rate and mean arterial pressure with dexmedetomidine while maintaining overall hemodynamic stability during colonoscopy⁷. Therefore, the modest reductions in heart rate and blood pressure observed in our study should be regarded as expected pharmacodynamic effects rather than adverse events.

Respiratory safety represents a major concern during pediatric procedural sedation. In the present study, oxygen saturation remained above 99% throughout the procedure in both groups, and no episodes of apnea, airway obstruction, or assisted ventilation were encountered. These findings are consistent with the respiratory-sparing characteristics of dexmedetomidine reported in recent systematic reviews³⁻⁵. Hamdan et al., in a meta-analysis of 98 randomized controlled trials involving 9,161 children, concluded that dexmedetomidine-based sedation provides a high probability of successful procedural sedation while maintaining an acceptable safety profile⁵. Similarly, Nie et al. reported significantly higher procedural success and lower postoperative nausea and vomiting without prolonging recovery time when dexmedetomidine was incorporated into pediatric sedation protocols⁴. The absence of major respiratory complications in the present study therefore further supports the safety of dexmedetomidine as an adjunct for pediatric colonoscopy.

Recovery characteristics are particularly important in ambulatory endoscopy because early discharge improves patient turnover and resource utilization. In the present study, recovery time based on the Modified Aldrete Score was slightly shorter with dexmedetomidine (18.59 ± 4.04 min) than with fentanyl (20.13 ± 5.05 min), although the difference was not statistically significant ($P = 0.185$). Mason et al. similarly reported a modest but statistically significant reduction in post-anesthesia care unit discharge time (60 vs. 63 minutes; $P = 0.0409$) following dexmedetomidine administration⁶. Nisar et al. also observed shorter recovery time (8.70 vs. 10.56 minutes) and reduced recovery room stay (12.90 vs. 15.14 minutes) with

dexmedetomidine–propofol⁹. Differences in discharge criteria, procedural duration, anesthetic protocol, and study design may explain the variation between studies. Nevertheless, our findings suggest that dexmedetomidine does not delay recovery despite providing superior analgesia. Colonoscopist satisfaction was rated as excellent in 71.9% of procedures performed under dexmedetomidine compared with 56.3% under fentanyl, although this difference did not reach statistical significance ($P = 0.193$). The improved procedural conditions observed with dexmedetomidine may be related to its combined sedative and analgesic properties, which facilitate patient immobility without excessive respiratory depression. Similar trends toward higher operator satisfaction have been reported in previous comparative studies⁸⁻¹⁰.

No patient in either group experienced clinically significant bradycardia, hypotension, oxygen desaturation, apnea, nausea, vomiting, or airway complications. This favorable safety profile reflects careful patient selection, standardized monitoring, and administration of sedation by experienced anesthesiologists. The findings are consistent with contemporary evidence supporting dexmedetomidine as a safe component of balanced pediatric procedural sedation³⁻⁵.

Limitations: The present study has certain limitations. It was conducted at a single tertiary-care center with a relatively small sample size, which may have limited the statistical power to detect differences in secondary outcomes such as propofol requirement and recovery time. The observational study design introduces the possibility of selection bias because the choice of sedation regimen was based on routine clinical practice rather than random allocation. In addition, the study evaluated only immediate peri-procedural outcomes, and long-term recovery, patient satisfaction, and neurobehavioral outcomes were not assessed.

CONCLUSION: Dexmedetomidine–propofol and fentanyl–propofol combinations both provided effective and safe procedural sedation for pediatric colonoscopy. However, dexmedetomidine–propofol was associated with significantly better post-procedural analgesia while maintaining

comparable sedation quality, hemodynamic stability, recovery time, and colonoscopist satisfaction. Although total propofol consumption was lower in the dexmedetomidine group, the difference was not statistically significant. No clinically significant cardiorespiratory adverse events were observed with either regimen. These findings suggest that dexmedetomidine may represent an effective opioid-sparing alternative adjunct to propofol for pediatric colonoscopy and may offer improved analgesic efficacy without compromising procedural safety.

ACKNOWLEDGEMENTS: The authors sincerely thank the faculty and staff of the departments for their support during the conduct of this study. The authors are also grateful to the patients and their parents/guardians for their participation and cooperation.

Funding: The authors received no external funding for this study.

CONFLICT OF INTEREST: The authors declare that there are no conflicts of interest related to this study.

REFERENCES:

1. Lightdale JR, Liu QY, Sahn B, Troendle DM, Thomson M and Fishman DS: NASPGHAN Endoscopy and Procedures Committee. Pediatric endoscopy and high-risk patients: A clinical report from the NASPGHAN Endoscopy Committee. *J Pediatr Gastroenterol Nutr* 2019; 68(4): 595-606. doi:10.1097/MPG.0000000000002277.
2. das Neves JF, das NevesAraújo MM, de PaivaAraújo F, Ferreira CM, Duarte FB, Pace FH, Ornellas LC, Baron TH and de Castro LE: Colonoscopy sedation: clinical trial comparing propofol and fentanyl with or without midazolam. *Braz J Anesthesiol* 2016; 66(3): 231-236.
3. O'Kane A, Quinney SK, Kinney E, Bergstrom RF and Tillman EM: A systematic review of dexmedetomidine pharmacology in pediatric patients. *ClinTransl Sci* 2024; 17(12): e70020. doi:10.1111/cts.70020.
4. Nie J, Li C, Yang G, Chang H and Ding G: An evaluation of dexmedetomidine in combination with midazolam in pediatric sedation: a systematic review and meta-analysis. *BMC Anesthesiol* 2024; 24: 210. doi:10.1186/s12871-024-02570-1.
5. Hamdan S, Adelou S, Jungo S, Diakonoff H, Treluyer JM and FronChabouis H: Drugs for procedural sedation and analgesia in children: a systematic review and meta-analysis. *Drugs R D* 2025; 25: 179-193. doi:10.1007/s40268-025-00522-9.
6. Mason KP, Park RS, Sullivan CA, Lukovits K, Halpin EM, Imbrescia ST, Cavanaugh D, Prescilla R and Fox VL: The synergistic effect of dexmedetomidine on propofol for paediatric deep sedation: a randomised trial. *Eur J*

- Anaesthesiol 2021; 38(5): 541-547. doi:10.1097/EJA.0000000000001350.
7. Seyam SH, Aboelsuod MAA and Ahmed IMA: Sedation for colonoscopy procedures using dexmedetomidine versus propofol-fentanyl infusions: a prospective randomized controlled trial. *Turk J Anaesthesiol Reanim* 2024; 52(2): 60-67.
 8. Kavousi E, Shariefnia HR, Pourfakhr P, Khajavi M and Behseresht A: Dexmedetomidine versus propofol in combination with fentanyl for sedation-analgesia in colonoscopy procedures: a randomized prospective study. *Middle East J Dig Dis* 2021; 13(4): 328-332. doi:10.34172/mejdd.2021.242.
 9. Nisar T, Zahoor SA, Khan T, Dar BA, Ali Z, Wani SQ and Shah AH: Comparison of dexmedetomidine-propofol and fentanyl-propofol for monitored anesthesia care (MAC): a prospective randomized study in lower GI endoscopies in paediatric age group. *Pediatr Anesth Crit Care J* 2018; 6(1).
 10. Karanth H, Murali S, Koteswar R, Shetty V and Adappa K: Comparative study between propofol and dexmedetomidine for conscious sedation in patients undergoing outpatient colonoscopy. *Anesth Essays Res* 2018; 12(1): 98-102.
 11. Ramsay MAE, Savege TM, Simpson BRJ and Goodwin R: Controlled sedation with alphaxalone-alphadolone. *Br Med J* 1974; 2(5920): 656-659.
 12. Hawker GA, Mian S, Kendzerska T and French M: Measures of adult pain: Visual Analog Scale for Pain (VAS Pain). *Arthritis Care Res (Hoboken)* 2011; 63(11): 240-252.
 13. Merkel SI, Voepel-Lewis T, Shayevitz JR and Malviya S: The FLACC: a behavioral scale for scoring postoperative pain in young children. *Pediatr Nurs* 1997; 23(3): 293-7.
 14. Malviya S, Voepel-Lewis T, Burke C, Merkel S and Tait AR: The revised FLACC observational pain tool: improved reliability and validity for pain assessment in children with cognitive impairment. *Paediatr Anaesth* 2006; 16(3): 258-65.
 15. Tripathi PR, Poddar U, Yachha SK, Sarma MS and Srivastava A: Efficacy of single- versus split-dose polyethylene glycol for colonic preparation in children: a randomized controlled study. *J Pediatr Gastroenterol Nutr* 2020; 70: e1-e6.
 16. Fang S, Song Y, Liu Y and Wang L: Randomized clinical trial: efficacy and tolerability of two different split doses of low-volume polyethylene glycol electrolytes for bowel preparation before colonoscopy in hospitalized children. *Pediatr Res* 2021; 90: 171-175.
 17. Socha P, Posovszky C, Szychta M, Viscogliosi F, Martemucci L and Grzybowska-Chlebowczyk U: EASYKID Study Group. Phase III randomized non-inferiority study of OSS versus PEG + electrolyte colonoscopy preparation in adolescents. *J Pediatr Gastroenterol Nutr* 2023; 76(5): 652-659. doi:10.1097/MPG.0000000000003745.
 18. Dere K, Sucullu I, Budak ET, Yeyen S, Filiz AI, Ozkan S and Dagli G: A comparison of dexmedetomidine versus midazolam for sedation, pain and hemodynamic control during colonoscopy under conscious sedation. *Eur J Anaesthesiol* 2010; 27(7): 648-652.

How to cite this article:

Kulkarni S, Mahajan K, Komulwar V and Patil A: Comparison of dexmedetomidine propofol and fentanyl propofol sedation for pediatric colonoscopy: an observational comparative study. *Int J Pharm Sci & Res* 2026; 17(11): 3567-75. doi: 10.13040/IJPSR.0975-8232.17(11).3567-75.

All © 2026 are reserved by International Journal of Pharmaceutical Sciences and Research. This Journal licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)