Global Academic Journal of Medical Sciences

Available online at www.gajrc.com
**DOI:** 10.36348/gajms.2023.v05i04.004

OPEN ACCESS

ISSN: 2706-9036 (P)
ISSN: 2707-2533 (O)

**Original Research Article**

# Effect of Dexamethasone in Management of Postoperative Nausea, Vomiting and Pain After Tonsillectomy in Paediatric Patients

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**Article History**
Received: 08.06.2023
Accepted: 17.07.2023
Published: 22.07.2023

**Abstract:** ***Introduction***: The effectiveness of dexamethasone (DEX) in reducing complication rates following paediatric tonsillectomy is still up for debate. The incidence of postoperative nausea and vomiting (PONV) and the severity of pain following paediatric tonsillectomy were examined by comparing concentrations of DEX 0.15 and DEX 0.5 mg/kg, respectively. ***Aim of the study***: The aim of the study is to assess the effect of Dexamethasone in management of postoperative nausea, vomiting and pain after tonsillectomy where the targeted patients are of 3 to 10 years children. ***Methods***: This prospective cross sectional study was conducted in the Department of Paediatric Anaesthesiology and Surgical ICU in Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh during July 2019 to June 2022. This study included 123 children undergoing elective tonsillectomy. The Institutional Ethics Committee approved this study and informed parental written consent was obtained from the parents before collecting the patients' information. ***Results***: The prevalence of early PONV was lower in both DEX groups (DEX 0.15: 22%; DEX 0.5: 26%; placebo: 48%; P=0.001). On the second day after surgery, the DEX groups had a lower rate of severe pain (DEX 0.15: 20%; DEX 0.5: 5%; placebo: 47%; P<0.001). The study was not conducted to assess a difference between the two dose groups of Dexamethasone. ***Conclusions***: The frequency of early and late PONV and the level of pain on the second postoperative day were both reduced by an i.v injection of DEX during the induction of anesthesia. To reduce the incidence of PONV, it appeared that a dose of DEX 0.15 mg/kg was just as effective as a dose of DEX 0.5 mg/kg.
**Keywords**: Dexamethasone; Paediatric; Tonsillectomy; Nausea; Pain; Vomiting.



## INTRODUCTION

Tonsillectomy, a type of surgery where tonsils, two oval-molded stack of tissue at the near of the throat — one tonsil on each side, are removed. Most of the time, a tonsillectomy is done for bad breathing at rest, however may be a treatment in any case when tonsillitis occurs frequently or does not respond to medication [1].

Tonsillar surgery, especially for children, has changed in recent years. The use of tried-and-true or novel methods for partial tonsillar resection is on the

**Citation:** MD. Maminur Rahman, MD. Jahirul Islam, Khadijatul Kubra, Noor-E-Jannat Tania, Afifa Ferdous (2023). Effect of Dexamethasone in Management of Postoperative Nausea, Vomiting and Pain After Tonsillectomy in Paediatric Patients. *Glob Acad J Med Sci*; Vol-5, Iss-4 pp- 202-207.

rise right now. Numerous cases of fatal complications following tonsillectomy continue to be reported in both scientific journals and the general media, typically involving postoperative hemorrhage [2].

Pain, nausea, vomiting and delays in eating are common in children who have had a tonsillectomy or adeno-tonsillectomy (surgery to remove the adenoids and/or tonsils). Dexamethasone, a corticosteroid, is sometimes given intravenously (through the veins) in one dose to try to stop vomiting after surgery. In a survey, it is found that one out of every five children who receive the medication, according to the review of trials, can avoid vomiting with a dose of corticosteroid during tonsillectomy or adeno-tonsillectomy. In addition, children recover faster from surgery and experience less pain [3]. Pain and PONV are to blame for a 14% hospital readmission rate in children undergoing ambulatory tonsillectomy [4].

PONV is multifactorial, with reported incidences ranging from 23% to 73% [5, 6]. Post-tonsillectomy pain is also multifactorial. It gets worse in the first three days after surgery and can last until day 10 [7].

Steroids can help reduce post-tonsillectomy morbidity because they are anti-emetic and anti-inflammatory by closely resembling the effects of adrenal gland-produced natural hormones. Steroids like dexamethasone, which reduces inflammation, can be prescribed at doses that are higher than body's normal levels. According to a recent Cochrane (a global independent network of researchers, professionals, patients, care givers and people interested in health) meta-analysis, "a single IV dose of DEX is an affordable, safe and effective way to reduce paediatric tonsillectomy morbidity [8]. The aim of this study was to determine how effective intravenous doses of DEX 0.15 mg/kg and DEX 0.5 mg/kg were on the incidence of postoperative pain relief after tonsillectomy in paediatric patients.

## OBJECTIVES

- General objective: The study aims to find the use and feedback of different postoperative pain killers used in tonsillectomy. This study targeted the use of *Placebo and* Dexamethasone to manage the postoperative complications mainly nausea, vomiting and pain in paediatric patients.
- Specific objective: The purpose of this study was to determine the effectiveness of DEX 0.15 and DEX 0.5 mg/kg in management of postoperative nausea, vomiting and pain after tonsillectomy in paediatric patients.

## MATERIAL AND METHOD

This prospective cross sectional study was conducted in the Department of Paediatric Anaesthesiology and Surgical ICU in Bangladesh Shishu Hospital and Institute, Dhaka, Bangladesh during July 2019 to June 2022. This study included 123 children undergoing elective tonsillectomy. The selection process as following

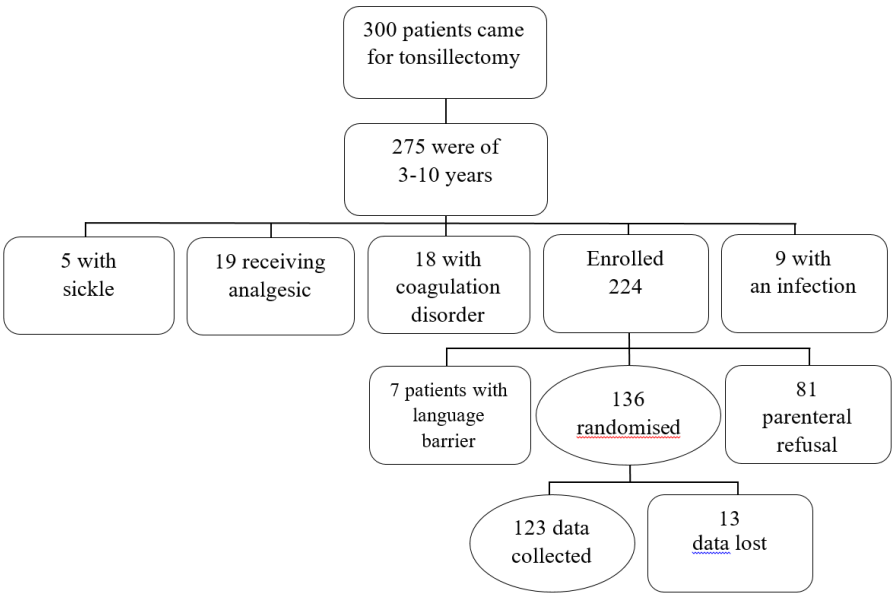


**Figure 1: Sample selection flowchart**

The Institutional Ethics Committee approved this study and informed parental written consent was obtained from the parents before collecting the patients' information. One hundred and twenty-three patients, aged 3–10 years, undergoing elective tonsillectomy who received DEX with or without Pethidine. Patients were randomized to three groups to receive 0.5 mg/kg DEX up to a maximum of 15 mg (DEX 0.5), 0.15

mg/kg DEX up to a maximum of 8 mg (DEX 0.15), or an equivalent volume (0.5 ml/kg) of Placebo (NaCl 0.9%). Block randomization was performed using an envelope system. Each bloc included 15 subjects, five in each treatment arm. An envelope indicating the allocation of treatment was drawn by an anesthesiologist who was not involved in the study on the morning of the procedure. A new set of 15 envelopes was made for each 15 subjects who signed up for the surgery. The treatment solution was prepared by the anesthesiologist who performed the randomization and was handed to the anesthesiology team in charge of the subject. All children were anesthetized using a standard method. Premedication consisted of midazolam 0.5 mg/kg rectally 30 min before induction for children under 4 years old or orally 45 min before induction for children 4 years old and older. During the procedure, pulse oximetry, heart rate (ECG), non-invasive arterial pressure, rectal temperature and end-tidal $CO_2$ were used to monitor the subjects. Sevoflurane and 50% nitrogen dioxide in oxygen were used to induce anesthesia. After the intravenous (IV) line, children received the randomized treatment solution (DEX or placebo) i.v., which contained 2 mg/kg of fentanyl, 15 mg/kg of paracetamol and 2 mg/kg of tramadol. Following the 4/2/1 rule, Ringer's lactated solution was administered to each subject. After tracheal intubation, sevoflurane in a 50/50 mixture of nitrous oxide and oxygen was used to maintain anesthesia. Dissection and electrocoagulation were used when the surgeon thought it was necessary to perform a tonsillectomy. Subjects were extubated when they were awake at the conclusion of the procedure and moved to the post-anesthesia care unit (PACU). On the PACU, trained nurses evaluated each subject. SPSS 20.0 and MS Excel programs were used with descriptive statistical methods.

- *Inclusive criteria:* Patients with the indications for tonsillectomy were obstructive sleep apnoea syndrome with tonsil hypertrophy, recurrent infections or tonsillar abscess were selected for study, in total 123.
- *Exclusive criteria:* This study excluded patients with active infection, diabetes mellitus, sickle cell disease, known coagulation disorders and preoperative treatment with anti-emetics, steroids, or analgesics. Patients weighing more than 32 kg were excluded in order not to exceed the maximum dose of *Dexamethasone*.

## RESULT

During the data collection from June 2019 to July 2022, 300 children came for tonsillar treatment. Due to fixed range of age for our study, we could select only 275 children were screened for participation in the study [Figure-1]. Among them 275 children got admitted in the hospital of which 13 were excluded because of missing data. There were thus 123 children in the final analysis. The patient characteristic and type of surgery did not differ in the three groups [Table 1].

Surgical re-exploration for only one subject (in the placebo group) was required due to significant bleeding. The time (in min) until release from the Post-Anesthesia Care Unit was not different in the gatherings reported as middle (25-75% intelligence level): Placebo: 120 (90–180); DEX 0.15: 120 (90–150); DEX 0.5: 120 (90–157); P=0.464. However, both during hospitalization and on postoperative day [Fig-2], the incidence of PONV was significantly lower in the DEX groups compared to the placebo group. The incidence of PONV in the two DEX groups was identical. Additionally, the DEX group used less Ondansetron than the Placebo group. Motoclopramide was given to only a few subjects: 3 people in the Placebo group, 2 people in the DEX 0.15 group and 1 person in the DEX 0.5 group. The number of subjects receiving Pethidine (PACU) or Diclofenac suppository on the ward following the administration of DEX did not decrease [Table-2].However, the placebo group had a shorter time to the first Diclofenac suppository dose (P= 0.017) than the DEX 0.15 (P= 0.017) and DEX 0.5 (P= 0.017) groups (P= 0.017). The prevalence of significant pain during hospitalization did not differ between the DEX groups and the placebo group. On the other hand, there was no difference in the incidence of significant pain between the DEX groups or the two doses on postoperative day 2 than the incidence of early day of surgery or postoperative day (D1) [Figure-2].

**Table 1:** ***Patient characteristics (N=123)***

| ***Parameter*** | **Placebo (n=45)** | **DEX 0.15 (n=38)** | **DEX 0.5 (n=40)** |
|---|---|---|---|
| Age (months) | 47 (37–62) | 43 (35–60) | 46 (35–59) |
| Weight (kg) | 18 (15–21) | 16 (14–19) | 16 (13–18) |
| Number having tonsillectomy with adenotonsillectomy | 42(94%) | 37(97%) | 40(100%) |
| Electrocoagulation | 33(74%) | 32(84%) | 30(76%) |

**Table 2: Need for analgesics and anti-emetics (N=123)**

| ***Parameter*** | **Placebo (n=45)** | **DEX 0.15 (n=38)** | **DEX 0.5 (n=40)** | **P-value** |
|---|---|---|---|---|
| Ondansetron | 23(*50*%) | 4(*11*%) | 10(25%) | 0.005 |
| Metoclopramide | 3(*7*%) | 2(*4*%) | 1(*2*%) | 0.578 |
| Pethidine | 24(*52*%) | 17(*43*%) | 15(*36*%) | *0.321* |

| | | | | |
|---|---|---|---|---|
| Diclofenac suppository | 24(*52%*) | 14(*38%*) | 16(*40%*) | *0.331* |

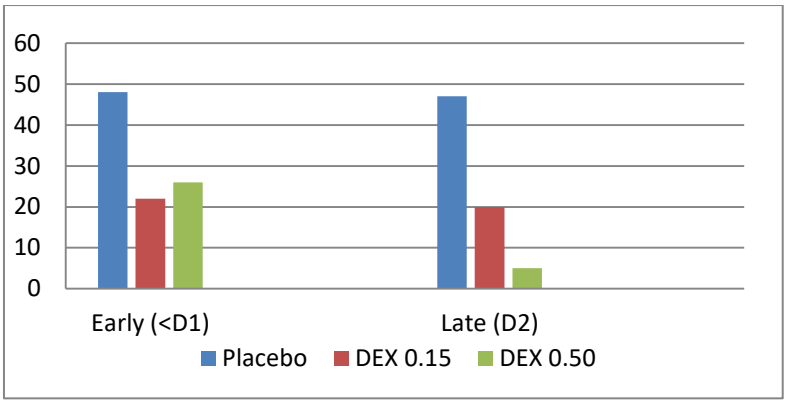


**Fig 2: Incidence of early postoperative day (D1) and late (D2) PONV in the three study groups**

## DISCUSSION

The incidence of early and late Prevention of Postoperative Nausea and Vomiting was reduced and pain scores on the second postoperative day were improved with a single dose of DEX administered during anesthesia induction. Despite the fact that the study was not powered for this endpoint, a dose of 0.5 mg/kg DEX did not appear to be more effective than a dose of 0.15 mg/kg. The effects of DEX on PONV and pain following paediatric tonsillectomy have been the subject of several studies. They frequently used a small number of patients and/or did not follow standard procedures for rescue treatment and anesthesia. Additionally, the few placebo-controlled randomized studies that examined the effects of a single intravenous (IV). The results of corticosteroid administration vary, with some studies demonstrating a beneficial effect while others did not. The counter emetic properties of DEX are deeply grounded, yet the instruments hidden this enemy of emetic impact remain to a great extent obscure. It has been hypothesized that prostaglandins, serotonin, or endorphin production are directly inhibited.

Although DEX's anti-inflammatory properties are well-known, there is still some debate regarding their effects on postoperative pain. We only observed an effect on pain on the second postoperative day. DEX's pharmacokinetic profile indicates that its anti-inflammatory effects should begin to manifest several hours after administration. Therefore, the fact that the effect of DEX on postoperative pain was only discovered on the second postoperative day is not surprising. This could likewise make sense of why a few examinations neglected to notice critical torment decrease with DEX in the quick postoperative period. Also up for debate is the right amount of DEX to take. In paediatric tonsillectomy, Gunter and colleagues and Kim and colleagues compared DEX doses ranging from 0.0625 to 1.0 mg/kg.

There was no evidence of a dose-dependent relationship between the incidence of PONV and pain. Karaman and colleagues compared the effects of two doses of DEX, 0.2 and 0.7 mg/kg, on PONV following tonsillectomy with a placebo group. They found that the DEX groups had a lower incidence of PONV than the placebo groups and there was no difference between the two doses. These reports are consistent with our results.

Only one study reported a dose-related increase in the incidence of postoperative bleeding; however, this study was quite small and bleeding was far outside the generally reported range of about 1%. Administration of DEX in children undergoing tonsillectomy has not been associated with significant side effects in the majority of studies. In addition, a recent study with 2788 children found no dose-dependent increase in postoperative hemorrhage associated with perioperative DEX administration (0.5 or 1.0 mg/kg). Our findings ought to be interpreted in light of the design of the study. We selected children between the ages of 3 and 10 in order to have a standardized anesthetic technique based on mask induction with sevoflurane and nitrous oxide.

We decided to administer DEX at the induction of anesthesia because it was demonstrated to be more effective than when administered at the end of the procedure. Indeed, mask induction is frequently frowned upon by children older than eight years old. It is difficult to diagnose nausea in children under the age of five. As a result, we defined PONV as the inability to expel gastric contents through vomiting or retching. We continued to use the term PONV rather than POV (postoperative vomiting), which only refers to vomiting but does not include retching, which is a sign of nausea [19].

Numerous studies have evaluated the effectiveness of corticosteroids for POV following tonsillectomy because of their anti-inflammatory effects in ENT surgery [9-15]. For the purpose of preventing

PONV in children undergoing tonsillectomy, Holt *et al.*, [10] compared the efficacy of tropisetron 0.1 mg/kg (maximum of 2mg) on its own to the combination of tropisetron 0.1 mg/kg (maximum of 2mg) and dexamethasone 0.5 mg/kg (maximum of 8mg). With the two medications directed intravenously during the hour of sedation enlistment, these creators presumed that the blend was essentially more compelling than tropisetron alone in lessening PONV. Splinter *et al.*, [16,17] and Henzi *et al.*, [18] conducted a review of the efficacy of dexamethasone when used in conjunction with other antiemetics.

A systematic review on the efficacy of corticosteroids as antiemetics for POV following tonsillectomy was carried out by Steward *et al.*, [11]. They found that children who received a single intraoperative intravenous dose of dexamethasone (0.15–1 mg/kg) had a twofold lower risk of POV in the first 24 hours than children who received a placebo. The maximum dose range was 8–25 mg.

Steward *et al.*, 's meta-analysis [16] came to the conclusion that a single intravenous dose of dexamethasone was a cost-effective, safe and effective method of lowering POV following paediatric tonsillectomy. The use of a single intravenous dose of dexamethasone during paediatric tonsillectomy was suggested due to the decreased postoperative morbidity, the relative safety and low cost of dexamethasone and the frequency of tonsillectomy procedures. Aouad *et al.*, and Vosdoganis and Baines [14] and Pappas *et al.*, 's [2-13] research provided additional support for these conclusions.

Aouad *et al.*, [12] found that a single dose of intravenous dexamethasone 0.5 mg/kg significantly reduced the incidence of POV in children during the first 24 hours, shortened the time to first oral intake and decreased the duration of intravenous fluid hydration, all of which contributed to an increase in patient satisfaction. According to Pappas *et al.*, [13] intravenous dexamethasone at a maximum dose of 25 milligrams per kilogram significantly reduced the incidence of PONV in the first 24 hours after discharge, improved oral intake, reduced the number of phone calls from parents and prevented patients from returning to the hospital for PONV management or poor oral intake. Dexamethasone significantly reduced POV following tonsillectomy, as Vosdoganis and Baines [14] found.

### LIMITATIONS OF THIS STUDY

Our study was a single center study. We could only study a few sample within the study period. There are more patients with tensile affecting their life but they are not coming back to the hospital for proper treatment after tensile recognition and depending on home remedy. After evaluating once those patients we did not follow-up them and have not known other possible interference that may happen in the long term with these patients.

## CONCLUSION AND RECOMMENDATION

In the study we found the utilization of dexamethasone for the counteraction of PONV is powerful and safe. 0.15-0.5 mg/kg for children are the most common intravenous doses in tonsillectomy. Dexamethasone should be given either immediately prior to or following the induction of anesthesia, or at the beginning of surgery. *After tonsillectomy in paediatric patients, use of DEX 0.15 and DEX 0.5 mg/kg in management of postoperative nausea, vomiting and pain is influential.*

### DECLARATION OF THE PATIENTS' CONSENT

We ensured permission of the Hospital Ethics Committee and the informed consent from the parents of the children were obtained during data collection and sampling.

**FINANCIAL SUPPORT AND SPONSORSHIP:** *Self supported study.*

**CONFLICTS OF INTEREST:** N/A

## REFERENCES

1. Andrews, P. L. R. (1993). The mechanism of emesis induced by anti-cancer therapies. *Emesis in Anticancer Therapy. Mechanisms and Treatment*, 113-161.
2. Aouad, M. T., Siddik, S. S., Rizk, L. B., Zaytoun, G. M., & Baraka, A. S. (2001). The effect of dexamethasone on postoperative vomiting after tonsillectomy. *Anesthesia & Analgesia*, *92*(3), 636-640.
3. Brown, P. M., Fowler, S., Ryan, R., & Rivron, R. (1998). ENT day surgery in England and Wales–an audit by the Royal College of Surgeons (Eng.) Comparative Audit Service. *The Journal of Laryngology & Otology*, *112*(2), 161-165.
4. Divatia, J. V., Vaidya, J. S., Badwe, R. A., & Hawaldar, R. W. (1996). Omission of nitrous oxide during anesthesia reduces the incidence of postoperative nausea and vomiting: a meta-analysis. *The Journal of the American Society of Anesthesiologists*, *85*(5), 1055-1062.
5. Henzi, I., Walder, B., & Tramer, M. R. (2000). Dexamethasone for the prevention of postoperative nausea and vomiting: a quantitative systematic review. *Anesthesia & Analgesia*, *90*(1), 186-194.
6. Hermans, V., De Pooter, F., De Groote, F., De Hert, S., & Van der Linden, P. (2012). Effect of dexamethasone on nausea, vomiting, and pain in paediatric tonsillectomy. *British journal of anaesthesia*, *109*(3), 427-431.

7. Holt, R., Rask, P., Coulthard, K. P., Sinclair, M., Roberts, G., Van Der Walt, J., ... & Rasmussen, M. (2000). Tropisetron plus dexamethasone is more effective than tropisetron alone for the prevention of postoperative nausea and vomiting in children undergoing tonsillectomy. *Pediatric Anesthesia*, *10*(2), 181-188.
8. Litman, R. S., Wu, C. L., & Catanzaro, F. A. (1994). Ondansetron decreases emesis after tonsillectomy in children. *Anesthesia & Analgesia*, *78*(3), 478-481.
9. Mayo Clinic Family *Health Book*, 5th Edition
10. Pappas, A. L. S., Sukhani, R., Hotaling, A. J., Mikat-Stevens, M., Javorski, J. J., Donzelli, J., & Shenoy, K. (1998). The effect of preoperative dexamethasone on the immediate and delayed postoperative morbidity in children undergoing adenotonsillectomy. *Anesthesia & Analgesia*, *87*(1), 57-61.
11. Splinter, W. M. (2001). Prevention of vomiting after strabismus surgery in children: Dexamethasone alone versus dexamethasone plus low-dose ondansetron. *Pediatric Anesthesia*, *11*(5), 591-595.
12. Splinter, W. M., & Rhine, E. J. (1998). Low-dose ondansetron with dexamethasone more effectively decreases vomiting after strabismus surgery in children than does high-dose ondansetron. *The Journal of the American Society of Anesthesiologists*, *88*(1), 72-75.
13. Splinter, W. M., & Roberts, D. J. (1996). Dexamethasone decreases vomiting by children after tonsillectomy. *Anesthesia & Analgesia*, *83*(5), 913-916.
14. Steward, D. L., Grisel, J., & Meinzen-Derr, J. (2011). Steroids for improving recovery following tonsillectomy in children. *Cochrane Database of Systematic Reviews*, (8).
15. Steward, D. L., Grisel, J., & Meinzen-Derr, J. (2011). Steroids for improving recovery following tonsillectomy in children. *Cochrane Database of Systematic Reviews*, (8).
16. Steward, D. L., Grisel, J., & Meinzen-Derr, J. (2011). Steroids for improving recovery following tonsillectomy in children. *Cochrane Database of Systematic Reviews*, (8).
17. Stuck, B. A., Windfuhr, J. P., Genzwürker, H., Schroten, H., Tenenbaum, T., & Götte, K. (2008). Tonsillectomy in children. *Deutsches Ärzteblatt International*, *105*(49), 852.
18. Vosdoganis, F., & Baines, D. B. (1999). The effect of single dose intravenous dexamethasone in tonsillectomy in children. *Anaesthesia and Intensive care*, *27*(5), 489-492.
19. Warnock, F. F., & Lander, J. (1998). Pain progression, intensity and outcomes following tonsillectomy. *Pain*, *75*(1), 37-45.