

COMPARISON OF CAUDAL DEXMEDETOMIDINE AND FENTANYL COMBINED WITH BUPIVACAINE IN PEDIATRIC PATIENTS UNDERGOING INFRAUMBILICAL SURGERIES

A SYSTEMATIC REVIEW AND META-ANALYSIS

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BACKGROUND

- Regional analgesia reduces opioid use and its associated side effects in pediatric perioperative care.
- Caudal blocks, commonly used for lower abdominal and urogenital surgeries, often include dexmedetomidine and fentanyl as adjuvants to enhance analgesia.
- This meta-analysis compares these two adjuvants combined with bupivacaine in pediatric infraumbilical surgeries, focusing on efficacy and safety.

METHODS

- A systematic search of PubMed, EMBASE, and the Cochrane Database identified randomized clinical trials comparing dexmedetomidine and fentanyl with bupivacaine.
- Primary outcomes included analgesia duration, side effects (hypotension, bradycardia, respiratory depression, vomiting, pruritus), and additional analgesia requests.
- Statistical analysis was conducted using the ‘meta’ and ‘metafor’ packages in RStudio.

RESULTS

- Hypotension risk was similar between groups (RR = 0.99).
- Bradycardia was 26% less frequent with fentanyl (RR = 0.74).
- Respiratory depression was nearly three times more common with fentanyl (RR = 2.93).
- Vomiting incidence was twice as high in the fentanyl group (RR = 2.01).
- Requests for additional analgesia were slightly lower with dexmedetomidine, but the difference was not statistically significant.
- Heterogeneity was low (I² = 0.0%), indicating consistent study findings.

221 Patients undergoing infraumbilical surgeries with caudal block

- Elfawal 2016
- Kanojia 2017
- Jarineshin 2016
- Sharma 2024

dexmedetomidine vs. fentanyl

Author	Study type	N Fenta	N dex	Mean age	M/F	Mean Weight (kg)	Dose of B + Fen	Dose of B + Dex
Elfawal 2016	P	30	30	6.1 / 6.2	17/13 // 20/10	20.5 / 21.6	0,75 ml/kg + 1 µg/kg	0,75 ml/kg + 1 µg/kg
Kanojia 2017	P	30	30	3.6 / 3.6	22/8 // 24/6	12 / 11.4	0.5 ml/kg + 1µg/kg	0.5 ml/kg + 1 µg/kg
Jarineshin 2016	P	21	20	3 / 3	18/3 // 18/2	12.95 / 12.15	1 ml/kg + 2µg/kg	1 ml/kg + 2µg/kg
Sharma 2024	P	30	30	>9	23/7 // 24/6	15.87 / 17.10	1 ml/kg + 2µg/kg	1 ml/kg + 2µg/kg

Table 1 - Comparison between the Fentanyl group (left side) and the Dexmedetomidine group (right side) in pediatric caudal block studies. The table includes the following data: author and year of the study, study type (P: prospective), number of participants in each group (N Fenta and N Dex), mean age, male/female distribution (M/F), mean weight, and doses used of bupivacaine combined with Fentanyl (Dose of B + Fen) or Dexmedetomidine (Dose of B + Dex).

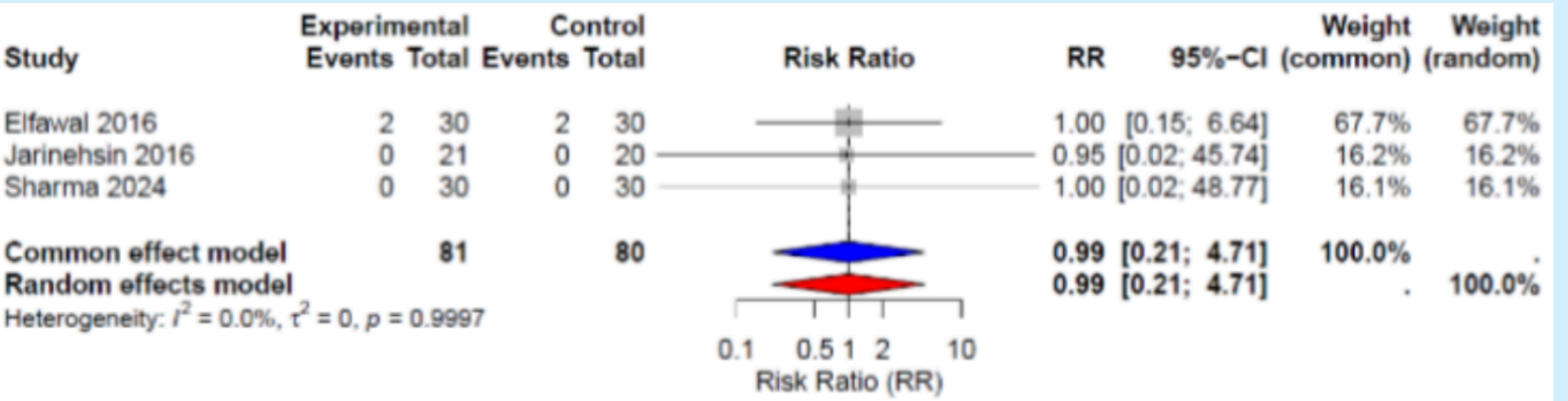
CONCLUSION

- Safer option: Dexmedetomidine had a better safety profile than fentanyl.
- Fewer complications: Lower risk of respiratory depression and vomiting.
- More bradycardia: Higher incidence despite safety benefits.
- Pediatric potential: Suitable for caudal blocks in infraumbilical surgeries.

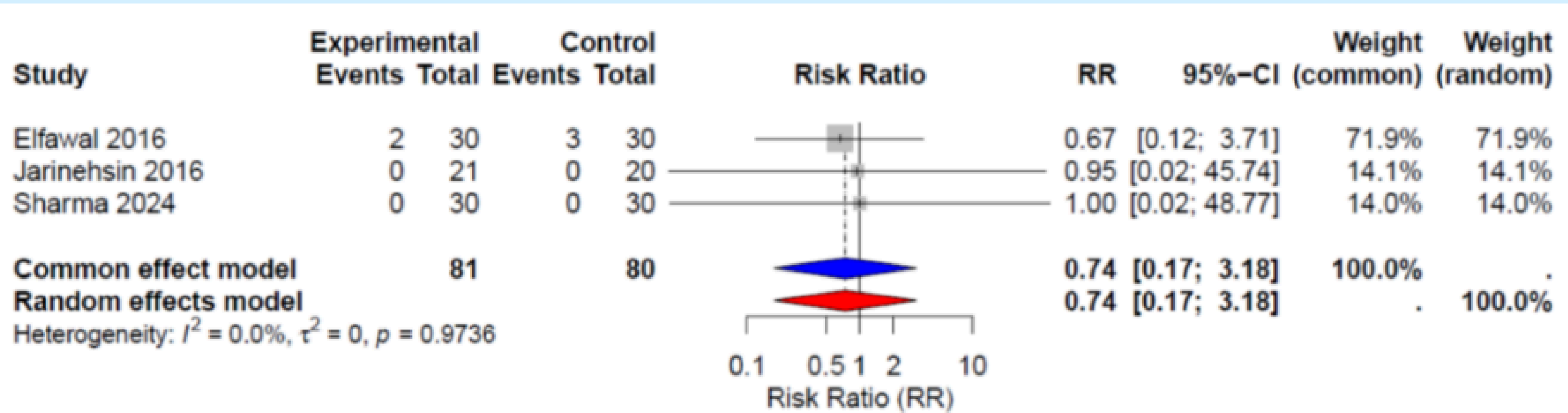
DISCUSSION

Dexmedetomidine showed a better safety profile than fentanyl, with lower risks of respiratory depression and vomiting, despite a higher incidence of bradycardia. Hypotension rates were similar, and its effect on additional analgesia requests was minimal. While findings were consistent (I² = 0.0%), the limited number of trials (n=4) underscores the need for larger studies to refine dosing and evaluate long-term outcomes.

The RR = 0.99 suggests that there are no significant difference in the risk of hypotension



The risk of bradycardia in the Fenta group is estimated to be 26% lower than in the Dex group (RR = 0.74).



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