Vibrotactile Devices for Pediatric Anxiety: A Systematic Review and Meta-analysis

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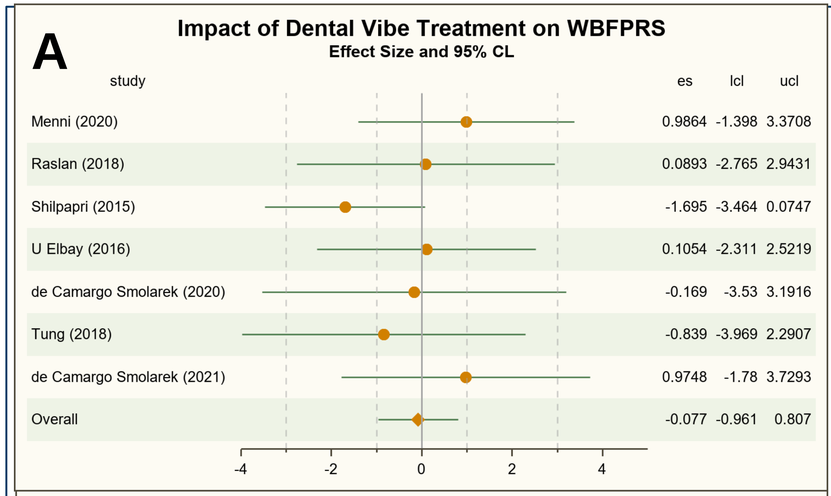
BACKGROUND

- Pain is an unpleasant sensory-emotional response.
- Reducing pain during dental procedures especially during intraoral administration of local anesthetic injections is critical in a pediatric practice.
- Vibrotactile devices (VD) are categorized as nonpharmacologic behavior management tools to decrease pain perception.
- VD is based on the 'gate-control' theory that suggests when a non-painful stimulus is placed between the source of pain and the brain it prevents the painful stimuli reaching the brain first.
- Reduction of pain or anxiety positively impacts the dental experience for children-adolescents.
- There are no comprehensive systematic reviews and meta-analysis reporting the efficacy of VD in children and adolescents.
- The purpose of this study was to evaluate the existing clinical trials in children using VD to determine the efficacy of VD for wider application in clinical dental practice.

METHODS

- Medical heading search (MeSH) terms were defined using following words: vibrotactile, buzzy, vibrating device, dental, behavior, injection, and children.
- MeSH terms were used to review the literature on VD using PubMed, Google Scholar, Ovid MEDLINE, Cochrane database, and clinical trial portals.
- A total of 3787 articles were identified with 37 articles shortlisted for abstract review.
- Following abstract review, 21 clinical trials using VD in children and adolescents were selected for systematic review and meta-analysis and identification of biases.

RESULTS



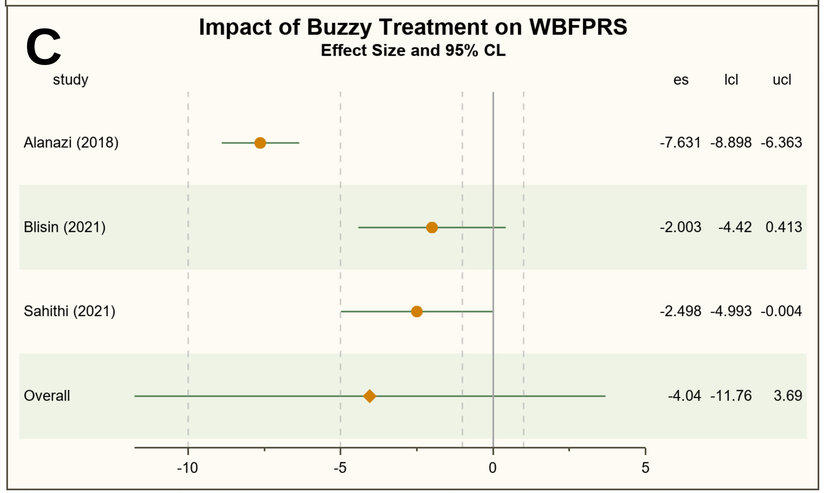


Figure legends: (A) Forest plot for Cohen's standardized effect size, by trial, and with the meta-analytic summary for Dental Vibe (B) Picture of Dental Vibe® (C) Forest plot for Cohen's standardized effect size, by trial, and with the meta-analytic summary for Buzzy (D) Picture of Buzzy®

RESULTS

- Most studies (85%) used Wong-Baker Faces Pain Rating Scales (WBFPRS) and Face-legs-activity-cry-consolability scales for behavior assessment to determine efficacy of VD.
- The systematic review indicated that there was no consistency and some biases among the clinical trials in children and adolescents.
- The meta-analytic estimate of the intervention effect for Buzzy on WBFPRS was -4.04 (s.e. = 1.79), with 95% confidence interval (-11.76, 3.69).
- The meta-analytic estimate of the intervention effect for Dental Vibe on WBFPRS was -0.077 (s.e. = 0.361), with 95% confidence interval (-0.96, 0.81).
- Most clinical trials (57%) concluded that VD is efficacious over control devices to reduce pain perception and improve patient behavior during dental care.

CONCLUSIONS

- While not statistically significant, VD groups report a lower pain score and may be clinically effective in positively modifying behavior of children and adolescents during dental treatment.
- More research is needed to improve utilization of VD in children and adolescent dental patients.

CLINICAL IMPLICATIONS

- This systematic review and meta-analysis demonstrated that VD is a safe and effective non-pharmacologic tool for use in pediatric dental practice.

ACKNOWLEDGEMENTS

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