

Feeding Intervention Outcomes for Infants with Cleft Lip/Palate and Their Families: A Systematic Review

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INTRODUCTION

Acronyms: CL = cleft lip, CLP = cleft lip and palate, CPO = cleft palate only

Background: Infants with cleft lip and palate (CLP) often require an adaptive feeding method because the majority do not feed well at the breast. The feeding mechanics among this population also differ, especially in regard to the sufficiency of intraoral suction (Gallagher et al., 2017).

Previous systematic reviews: One systematic review addressing CLP feeding interventions in research from 1955 to 2002 conducted by Reid et al. reveals a lack of replication of trials, small sample sizes, and the heterogeneity of samples (Reid et al., 2004). Later, after reviewing five randomized control studies, Bessell et al. (2011) found no significant growth outcomes based on the presence of maxillary plate, breastfeeding over spoon-feeding, or bottle type.

Our review: This systematic review is intended to investigate the progress of research addressing feeding interventions for the CLP infant population since Bessell et al. (2011). We reviewed a broader scope of the literature published after 2010 by including more study designs of various quality levels.

METHODS

Research question: In infants with isolated cleft lip and palate or cleft palate only, what is the impact of feeding interventions on child and family outcomes?

Databases: PubMed and ProQuest Psychology

Date range: 01/2010-12/2017

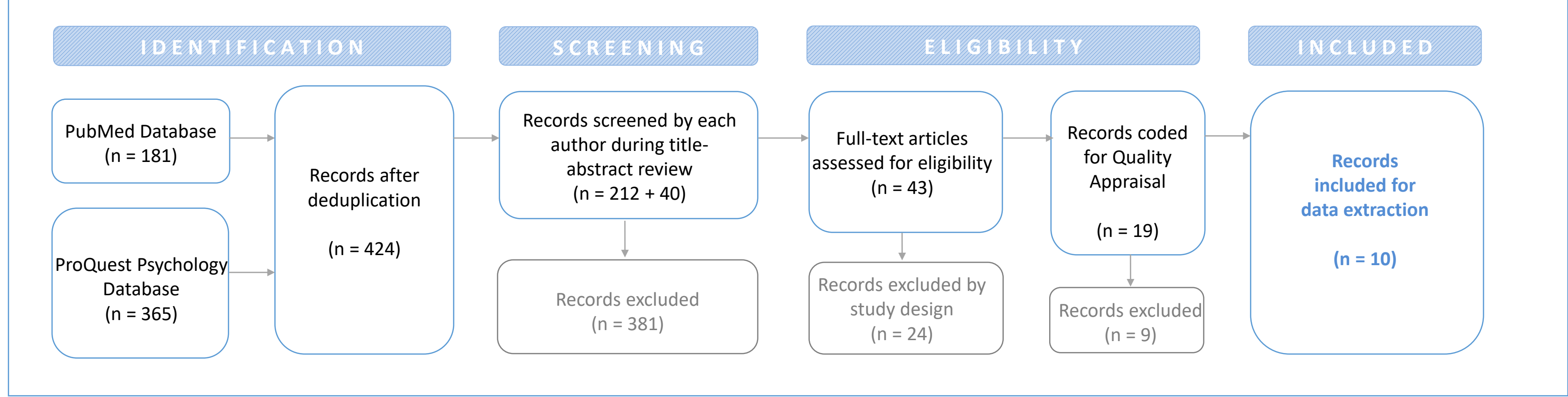
Search terms: cleft palate AND (feeding OR breast feeding OR breastfeeding OR bottle feeding OR oral intake) AND (intervention OR interventions OR therapy OR therapies OR treatment OR treatments OR strategy OR strategies OR medication OR modifications OR technique OR techniques) AND (infant OR infants OR child OR children OR newborn OR newborns)

Inclusion criteria: English text only, infant/child, isolated/non-syndromic cleft palate, any feeding intervention

Exclusion criteria: Pierre Robin, micrognathia, syndromic cleft palate, not peer-reviewed

Review process: Twenty percent of the titles and abstracts were double-reviewed with blinding with 98% agreement on inclusion/exclusion, and 100% agreement after a consensus discussion. All of the articles for full-text review were blind double-reviewed with 100% agreement. The research team conducted quality appraisals using the Joanna Briggs Institute quality appraisal tools, and extracted relevant data from the articles that remained following the quality appraisals.

PRISMA FLOW DIAGRAM



RESULTS

Initial search: 424 articles were brought in after deduplication, which we narrowed down to 43 following our title and abstract reviews. We categorized the remaining articles by study type and chose to eliminate case studies, case series, and systematic reviews, and any that did not meet inclusion criteria after a brief review. This resulted in 19 remaining articles.

Full-text review: After completing thorough full-text reviews on these articles, one was found to be a presentation, another was a quality improvement project, and several others did not fully meet our inclusion criteria, resulting in 13 remaining articles.

Quality appraisals: Ten articles remained following the quality appraisal process. Five were high quality, three were lesser quality, and two were low quality.

Data extraction: Data was extracted from six retrospective cross-sectional analyses, two randomized control trials, one prospective cohort study, and one prevalence study. A summary of results is presented in *Table 2* and study characteristics and outcomes are present in further detail in *Table 1*.

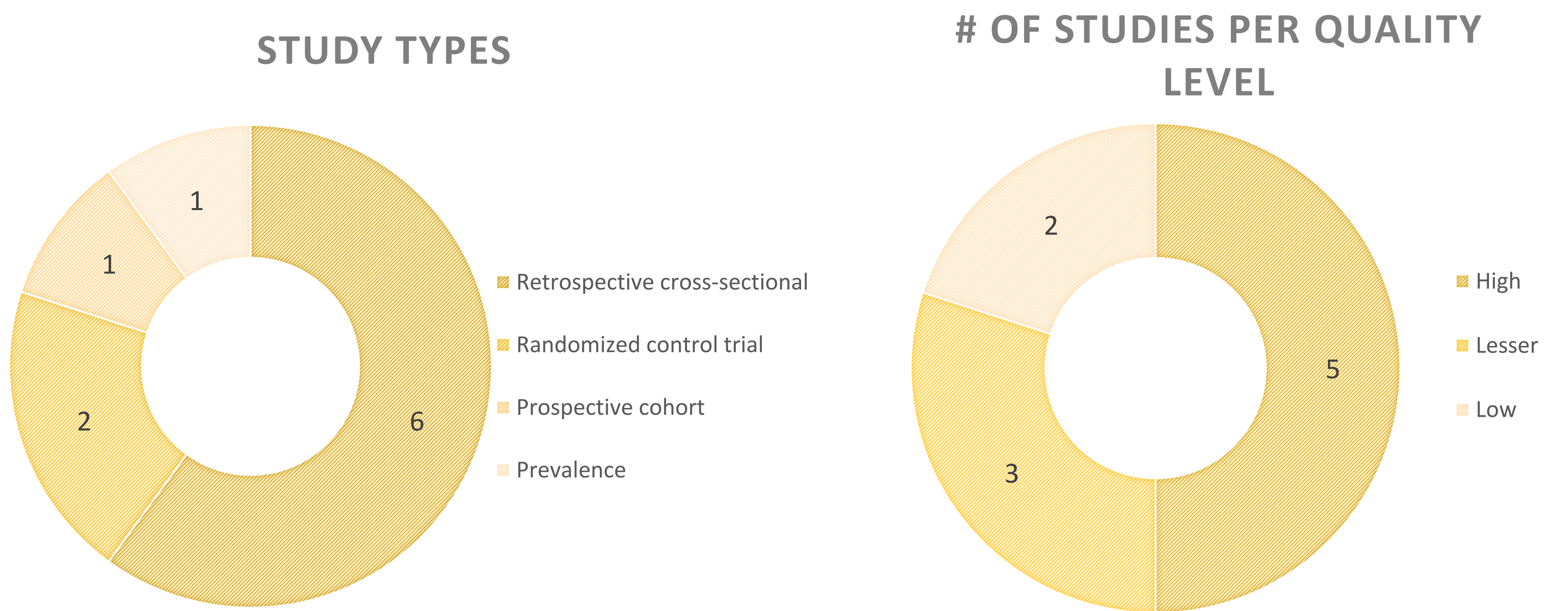


TABLE 1: STUDY CHARACTERISTICS AND OUTCOMES

Study	Country	Cleft Types Included	Feeding Techniques and/or Interventions	Infant and/or Family Outcomes
Zarate et a. (2010)	USA	Unilateral CL and CP = 53.75% Unilateral CL = 17.92% Bilateral CL and CP = 16.94% CPO = 10.1%	Early education, increased formula energy concentration, nasogastric feeding tube	<ul style="list-style-type: none">Patients with early education had a smaller weight-for-age percentile decrease during first year of life; not statistically significantInfants who received feeding interventions had significantly increased weight gain rate over time
Ravi et al. (2015)	India	All had CLP; unilateral vs bilateral was not noted	Paladai feeding vs bottle feeding vs spoon feeding	<ul style="list-style-type: none">Mean weight and rate of weight gain was greater with paladai feeding compared to bottle or spoon feeding
Martin & Greatrex-White (2014)	England & Wales	Complete CPO = 48% Incomplete CPO = 14% Incomplete unilateral CLP = 14% Complete unilateral CLP = 24%	Breastfeeding/breast + expressed breastmilk (EBM) vs EBM only vs formula vs squeezable bottle	<ul style="list-style-type: none">Type of cleft had a larger effect on weight gain than feeding methodMothers were more satisfied with the softplis bottle compared to other squeezable bottles
Kaye et al. (2017)	USA	CL = 37% CLP = 34% CPO = 29%	Increased volume of intake, concentration of caloric density in milk	<ul style="list-style-type: none">Increase in volume of intake and concentrating the caloric density of milk were the two most common interventions50% of infants with CL were breastfed compared to 0% of the CLP and 3.5% of the CPO groups
Ize-Iyamu & Saheeb (2011)	Nigeria	Bilateral CLP = 37% Unilateral CLP = 56% CPO = 7%	Syringe feeding vs cup and spoon feeding	<ul style="list-style-type: none">Syringe feeding resulted in less regurgitation and spillBabies fed a combination of formula and breastmilk via syringe gained more weight between 10 and 14 weeks old than babies fed only breastmilk via syringe or cupBabies syringe-fed a combination of formula and breastmilk also gained more weight than babies fed the same combination by cup and spoon
Hubbard, Baker & Muzaffar (2012)	USA	Unilateral CLP = 65% Bilateral CLP = 35% All had complete CLP	Prenatal counseling and feeding instruction	<ul style="list-style-type: none">22% of infants whose parents had not received prenatal counseling were admitted to the NICU for feeding issues compared to 10% of those who had received counselingMedian length of stay in the NICU was 1 day for infants whose parents had received counseling compared to 3 days for those who had not
De Vries et al. (2014)	Netherlands	All had CPO; syndromes were not excluded but were reported separately	Nasogastric feeding tube (NG tube)	<ul style="list-style-type: none">17.4% of infants with CPO who did not have other anomalies had feeding difficulties which required an NG tube58.3% had feeding difficulties but did not require an NG tube
Britton, McDonald & Welbury (2011)	Scotland	CPO = 48% Unilateral CLP = 23% CL = 17% Bilateral CLP = 12%	NG tube, pre-surgical appliance	<ul style="list-style-type: none">29% of cleft infants required an NG tube for weight gain concernsSignificantly more infants with CPO than CLP required an NG tube compared to CL infants26% of infants in the study used pre-surgical appliances, and 70% of their parents reported improved feeding and cosmetic outcome
Augsornwan et al. (2013)	Thailand	Incomplete CL = 40.6%, complete CL = 12.5%, unilateral complete CLP = 31.2%, bilateral complete CLP = 15.6%	Breast/bottle feeding vs spoon/syringe feeding	<ul style="list-style-type: none">No statistically significant difference in wound dehiscence between breast/bottle and spoon/syringe feedingInfants and parents were more comfortable with breast/bottle feeding based on parent reports
Alperovich (2017)	USA	Unilateral CLP = 56%, Bilateral CLP = 24%, Unilateral CL = 15%, Bilateral CL = 5%	Prenatal counseling	<ul style="list-style-type: none">Parents who received counseling were significantly more likely to feed their infants breastmilk

RESULTS CONT.

TABLE 2: RESULTS SUMMARY

COMMON FEEDING INTERVENTIONS	FEEDING TECHNIQUES
<ul style="list-style-type: none">Parental education/counseling	<ul style="list-style-type: none">Bottle-feeding with a squeezable bottle (using expressed breastmilk, formula, or a combination)
<ul style="list-style-type: none">Increased volume of intake	<ul style="list-style-type: none">Syringe feeding
<ul style="list-style-type: none">Concentration of caloric density	<ul style="list-style-type: none">Paladai feeding (one study – Ravi et al. 2015)
<ul style="list-style-type: none">Nasogastric feeding tube	<ul style="list-style-type: none">Cup and spoon feeding
	<ul style="list-style-type: none">Breastfeeding (uncommon with CLP or CPO)

DISCUSSION

Conclusion: Infants with CLP or CPO have more feeding difficulties than infants with only CL (Kaye et al., 2017), and we confirmed that the type of cleft has a greater effect on weight gain than the type of bottle used to feed the infant (Montagnoli et al., 2005; Martin & Greatrex-White, 2014).We identified parent education, increase in volume of intake, concentration of caloric density, and placement of a nasogastric feeding tube as common feeding interventions (Britton, McDonald, & Welbury, 2011; De Vries et al., 2014; Hubbard, Baker & Muzaffar, 2012; Kaye et al., 2017; Zarate et al., 2010). Overall, these interventions may lead to better growth and an improved likelihood of infants with cleft palate being fed breastmilk (Alperovich et al., 2017; Zarate et al., 2010) or possibly a combination of breastmilk and formula (Ize-Iyamu & Saheeb, 2011). An important finding from this review however is that the preferred method of feeding by mothers is dependent on their location and healthcare system. This disrupts the premise for the generalized popularity of the Haberman feeder, for instance, over other methods of feeding infants with CLP. This information also suggests that studies conducted at university hospitals may provide conclusions that are not accurate for families in rural settings or developing countries.

Future research: Collectively, the articles we reviewed are consistent with the notion that there is a need for more high-quality studies in this area, particularly randomized control trials. We believe future studies seeking to expand this area of research should address: comfortable feeding methods used by parents, feeding methods or interventions that result in the least regurgitation, and methods best for feeding immediately after palatal surgery, in regard to pain management and wound healing. We are also aware of the limitations of research in this field. The nature of research in this population is such that many potential studies cannot fulfill the criteria for a high quality study. Being aware of these limitations will hopefully encourage other researchers to consider a broader scope of articles in future systematic reviews of the literature. We encourage professionals who are interested in offering successful interventions and making an impact on the feeding outcomes of their cleft/lip and palate patients to listen to the experiences of past and current patients. In doing so, providers of care and teams alike can launch in-house quality improvement projects and adjust their services to enhance patient-centered care.