



## EDITORIAL

# Complementary feeding in the first year of life: choking and gagging; what about nutrition?\*



Joan C. Arvedson 

*Children's Wisconsin and Medical College of Wisconsin, Division of Pediatric Gastroenterology, Milwaukee, Wisconsin, USA*

Complementary feeding is the general and generic term to describe oral feeding changes in the second half of the first year of life in typically developing infants. By 6 months of age, infants born at term with no underlying genetic, pulmonary, gastrointestinal, or neurologic diagnoses appear ready to advance oral feeding. There are multiple ways to add foods to what has been a liquid diet via nipple feeding either by breast or bottle and often both types. Nutrition needs are met adequately through the first year of life with breast milk which is considered the best nutrition for infants. Infant formulas vary with a number of specialized formulas (beyond the scope of this commentary).

Baby-led weaning (BLW) approach begins with infants at about 6 months of age. BLW has grown in popularity over the last 10-15 years since it was first described by Gill Rapley, a health visitor and midwife in the U.K.<sup>1</sup> Infants are allowed to self-feed family foods in their whole form instead of the traditional parent-led processes of offering pureed baby food (commercial or home blenderized foods) with gradual changes to lumpy foods and finger foods. With BLW, infants are allowed to choose what, and how much, they eat with the infant actively participating in family mealtimes. The definition of a baby-led approach itself is not clear as different research studies have approached the classification in different ways as noted by Brown, Jones, & Rowan.<sup>2</sup> Parent reports of feeding approaches may contain a range of food options (e.g., some spoon-feeding and purees in addition to a child simply self-feeding food in “whole form.”).

In the report by de Paiva and colleagues (2023 in this issue),<sup>3</sup> 3 variations of complementary feeding methods were compared with outcome measures of choking and gagging reported retrospectively at 9 and 12 months, which

leads to questions regarding accuracy in recall as well as interpretation of definitions. These authors are to be commended for carrying out a longitudinal randomized clinical trial. Questions arise in relation to variables that were not possible to control. These variables include but are not limited to, all groups started with two meals per day (breakfast and lunch) with dinner included after one month. The variability in the feeding focuses makes it difficult for readers to accept and interpret the findings. Adult presence was a factor throughout the entire study. It is not possible to rule out bias in the parents who agreed to participate (e.g., levels of education, socioeconomic status, cultural variables, to name a few).

Interpretations of the terms CHOKING and GAGGING differ among professionals as well as primary caregivers of infants and young children. Given the risks that can occur for children who may or may not be prepared to manipulate food that must be “broken down” in the mouth in order to swallow safely, caregivers must be vigilant observers as children embark on the expansion of foods. Once infants are deemed ready to advance oral skills beyond nipple feeding, caregivers are challenged to select the safest and most efficient processes for their children. Oral feeding skill development is considered part of global neurodevelopmental skill levels that include gross and fine motor skills; gastrointestinal, pulmonary, and upper airway status; genetic and neurologic diagnoses/etiologies.

Oral feeding should be pleasurable for the child and feeder, stress free, time-limited, and developmentally appropriate while not jeopardizing nutrition/hydration needs. Multiple factors must be considered in relation to both intra- and inter-individual variability, given many children are unpredictable.

**Choking.** A standardized definition of choking is needed in order to report findings in research protocols and to

\*See paper by Paiva et al. in pages 574-81.

E-mail: [jcarved@aol.com](mailto:jcarved@aol.com)

interpret findings. Currently, descriptions of choking have similarities, but there is not one single definition. The description by these authors follows: “Choking is a serious event in which the airway is partially or completely obstructed by a foreign body, making it impossible for the children to resolve it on their own, requiring choking maneuvers or medical assistance.” Anecdotal reports that describe choking as causing simple coughing seems contrary to the definition of choking. How can “simple coughing” be labeled choking?

Infants following a baby-led approach to feeding that includes advice to caregivers on minimizing choking risk do not appear more likely to choke than infants following more traditional feeding practices as noted by de Paiva and colleagues. Multiple reports support those findings (see reference list included with this report). However, findings that show children in all groups offered foods that pose a choking risk are concerning and emphasize the needs for further research. Examples of foods commonly reported as “high choke risks” can be found in multiple sources.

**Gagging.** Multiple factors are shown to precipitate gagging across a range of ages in children and adults. It is not unusual for a person to gag at the sight of some foods, or the smell/odor before anything ever gets into the mouth. Young children who are just beginning to experience solid food may initiate a gag when food is at the tip of the tongue. Clearly those “gags” do not relate to swallowing – simple observation can document those experiences, whereas it is not possible to delineate pharyngeal swallowing by observation of someone eating and drinking.

Given that babies are learning to eat, trial and error are to be expected. Consuming solid food is not instinctive or automatic. The process involves placement of food on molar tables (a term used when molars have not erupted), vertical munching initial action, with lateral tongue action to move food to the opposite side of the mouth, for bolus formation. Children are at greater risk for gagging or swallowing food whole if/when placement is at mid-tongue, particularly if the food item is small and round. These types of foods are more likely to result in a gag, cough, or even choking when a chunk of food gets into the pharynx if not broken down and mixed with saliva. Those processes during bolus formation in the oral cavity are needed for safe and timely initiation of a pharyngeal swallow – at all ages and stages of oral feeding. Infants need to learn to regulate the amount of food they can chew and swallow at a time. Gag is not surprising and may result in expelling the food or bringing the food back into the mouth if it has reached the pharynx or the child may munch/chew further and swallow a smaller piece each time.

Although it may seem alarming, gagging is in fact a safety mechanism designed to prevent choking. It happens whether a child is in the spoon-fed weaning method or baby-led weaning. Signs of gagging are variable and may include, but are not limited to, simple cough, tongue protrusion, and retching movements or even vomiting. Babies also gag on liquids as they learn the rhythm of sucking. Gagging may be noisy. Parents may find gagging frustrating to see food coming out of the mouth. Parents are encouraged to remember that gagging is not surprising as part of the weaning process and in fact, to be expected, occasionally or intermittently.

Multiple questions arise in the investigation reported by de Paiva and colleagues. These same questions arise in a review of similar published reports that are cited by these authors. For example, infants following a baby-led approach to feeding that includes advice on minimizing choking risk do not appear more likely to choke than infants following more traditional feeding practices as mentioned previously. However, the large number of children in BLW/BLISS as well as PLW-offered foods that pose a choking risk is concerning (e.g., Fangupo & colleagues, 2016).<sup>4</sup> In the current report, a folder (Figure 1 of reference 3,<sup>3</sup> see for details) was prepared for caregivers in which choking and gagging were defined.

Reports were made by parents via questionnaires at 9 and 12 months, but events were not observed in any organized way by researchers. According to these authors, mothers received information regarding nutritional intervention on complementary feeding and prevention of choking and gagging when their infants were 5.5 months of age. The authors stated with no rationale that the “first episode of choking or gagging was considered for analysis.” Other reports that were cited by these authors demonstrate similar inconsistencies in the use of these terms which also leads to skepticism regarding the accuracy and utility of these findings.

The authors stressed that adult supervision was integral to the feeding situation, which is fundamental to all feeding of young children regardless of specific approach. Parent training was carried out prior to the initiation of the research protocol. The presence of the mother during the child’s feeding “may have provided a better identification of choking episodes and an agile solution to the event, making feeding safer regardless of the method used.” It would be helpful to have a comparison “better” than what? These authors wisely stated the limitations of their findings including the fact that the questionnaires were applied retrospectively by parent reports, which could lead to “memory bias”. They added that they believe “that choking episodes were memories that mark mothers.” Question from this reviewer: What does it mean that “memories mark mothers”? Another interesting observation regarding the sample described as “socioeconomically favored, which may limit the applicability to other socioeconomic realities.” Might this process of baby-led weaning have a built-in bias that could include educational levels and perhaps cultural differences as well? Table 1 of reference 3<sup>3</sup> shows no statistically significant differences in the educational level of mothers for the three groups in this report. Another possible limitation relates to the fact that parental and child behavior interactions (e.g., crying) were not investigated. Questions arise regarding possible consideration for such involvement in the occurrence of choking.

De Paiva and colleagues were clear about the factors they measured, which did not include any data regarding nutrition/hydration status among the different approaches to complementary feeding. The studies cited by this group did not appear to raise a question regarding possible differences in nutrition/hydration with changes in approach to complementary feeding.

What is known about the nutrition/hydration adequacy of these commonly used approaches to facilitate advances in oral feeding during the second half of the first year of life? Clearly, it is not possible to include all aspects of interest in

any single research project, with most reports focused on choking/gagging. However, nutrition and hydration considerations are fundamental to all aspects of feeding.

A review by Bocquet and colleagues (2022)<sup>5</sup> revealed that BLW has some obvious downsides that include nutrition-related factors, for example, infants may not get enough energy, iron, zinc, vitamins, and other nutrients, or too much protein, saturated fat, salt, or sugar. They stressed that additional scientific studies are needed to delineate choking vs gagging. These authors concluded that in 2022, the Nutrition Committee of the French Pediatric Society considers data published to date are not sufficient to advise BLW in preference over standard or usual complementary feeding carried out according to current recommendations.

Similar to Bocquet and colleagues, Boswell (2021)<sup>6</sup> found that parents who implemented BLW had higher levels of education, breastfed for longer, and differed in other personality traits than parents carrying out other means of complementary feeding. Fear of choking was an important factor in parents' decision not to implement BLW, but that fear was not supported by the literature. This profile of eating behaviors in BLW confers a reduced obesity risk. However, few studies have examined the relationship between BLW and infant growth in any robust way. These reports concluded that BLW does not seem to increase the risk of inadequate zinc or iron intake; however, adequate intake of these micronutrients is advocated for all infants. BLISS is reported to be as nutritionally adequate as traditional spoon-feeding and may address some concerns about nutritional adequacy of unmodified BLW with concerns raised about high intakes of sodium and added sugars by 24 months (Williams Erickson et al, 2018).<sup>7</sup>

A better understanding of the impacts of BLW/BLISS is needed to inform evidence-based recommendations to support and guide parents in complementary feeding methods. The adoption of an adequate weaning method is a cornerstone in the development of life-long health status. An optimal strategy has the potential to reduce the risk of feeding

disorders and other health problems later in life (Dipasquale & Romano, 2020).<sup>8</sup> These data suggest that baby-led weaning should be defined more comprehensively. Moreover, its potential influence on developmental domains beyond risks for choking and gagging, as well as nutrition and eating behavior warrants future targeted exploration. Many questions remain for future research in this important area of infant/child well-being.

## Conflicts of interest

The authors declare no conflicts of interest.

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