



# Modified Version of Baby-Led Weaning Does Not Result in Lower Zinc Intake or Status in Infants: A Randomized Controlled Trial



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## ARTICLE INFORMATION

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Table 4 is available at [www.jandonline.org](http://www.jandonline.org)

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## ABSTRACT

**Background** Little is known about zinc intakes and status during complementary feeding. This is particularly true for baby-led approaches, which encourage infants to feed themselves from the start of complementary feeding, although self-feeding may restrict the intake of zinc-rich foods.

**Objective** To determine the zinc intakes, sources, and biochemical zinc status of infants following Baby-Led Introduction to Solids (BLISS), a modified version of Baby-Led Weaning (BLW), compared with traditional spoon-feeding.

**Design** Secondary analysis of the BLISS randomized controlled trial.

**Participants/setting** Between 2012 and 2014, 206 community-based participants from Dunedin, New Zealand were randomized to a Control or BLISS group.

**Intervention** BLISS participants received eight study visits (antenatal to 9 months) providing education and support regarding BLISS (ie, infant self-feeding from 6 months with modifications to address concerns about iron, choking, and growth).

**Main outcome measures** Dietary zinc intakes at 7 and 12 months (weighed 3-day diet records) and zinc status at 12 months (plasma zinc concentration).

**Statistical analyses performed** Regression analyses were used to investigate differences in dietary intakes and zinc status by group, adjusted for maternal education and parity and infant age and sex.

**Results** There were no significant differences in zinc intakes between BLISS and Control infants at 7 (median: 3.5 vs 3.5 mg/day;  $P=0.42$ ) or 12 (4.4 vs 4.4 mg/day;  $P=0.86$ ) months. Complementary food groups contributing the most zinc at 7 months were “vegetables” for Control infants, and “breads and cereals” for BLISS infants, then “dairy” for both groups at 12 months. There was no significant difference in mean±standard deviation plasma zinc concentration between the Control (62.8±9.8 μg/dL [9.6±1.5 μmol/L]) and BLISS (62.8±10.5 μg/dL [9.6±1.6 μmol/L]) groups ( $P=0.75$ ).

**Conclusions** BLISS infants achieved similar zinc intake and status to Control infants. However, the BLISS intervention was modified to increase iron intake, which may have improved zinc intake, so these results should not be generalized to infants following unmodified BLW.

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TRADITIONALLY, PARENTS INTRODUCE COMPLEMENTARY foods to their infant by spoon-feeding them puréed food, often a fortified rice cereal or a single fruit or vegetable. Over time, greater texture is introduced so that by the time the infant is 12 months of age, they are eating what the rest of the family eats,<sup>1-3</sup> including a reasonable proportion of finger foods. An alternative approach, known as Baby-Led Weaning (BLW), is increasing in popularity in New Zealand,<sup>4</sup> the United Kingdom,<sup>5</sup> Canada,<sup>6</sup> and more recently in the United States.<sup>7</sup> In BLW, infants feed themselves all their food from the start of complementary feeding. This means that all of their food needs to

be finger foods that they can hold themselves, because they are not being spoon-fed by their parent or caregiver. Although there are several proposed advantages of BLW,<sup>8</sup> concerns have also been expressed by health professionals,<sup>9</sup> including the potential for an increased risk of iron deficiency. The richest sources of iron are also key sources of zinc, so zinc status may also be of concern. No studies have yet investigated the impact of a baby-led approach to complementary feeding on biochemical zinc status.

Foods infants consume when using a baby-led approach may not provide adequate amounts of zinc if there is an emphasis on fruit and vegetables (which are easy foods for infants to hold and feed themselves but are low in bioavailable zinc) or if other foods such as meat that are high in bioavailable zinc are not offered because parents are concerned about choking.<sup>9</sup> This would be a concern because complementary foods are a critical source of zinc from 6 months of age, by which time breast milk no longer provides sufficient zinc.<sup>10</sup> Inadequate zinc status in early childhood has been associated with increased risk of infection<sup>11,12</sup> and impaired growth.<sup>13</sup> Yet, to date, only one study has compared the dietary intakes of infants following a baby-led approach with those of infants following a more traditional approach to complementary feeding.<sup>14</sup> In this small study, 6- to 8-month-old infants who were following a BLW style of complementary feeding had significantly (by 21%) lower zinc intakes than their age- and sex-matched counterparts who were following traditional spoon-feeding.<sup>14</sup> Because infants and toddlers from high-income countries may already be at risk of mild zinc deficiency,<sup>15,16</sup> it is important to understand what foods are the key sources of dietary zinc and to understand whether zinc intakes and biochemical status of infants differ between traditional spoon-feeding and baby-led approaches to complementary feeding.

The primary aim of the Baby-Led Introduction to Solids (BLISS) study was to determine whether a modified version of BLW prevents young children from becoming overweight, without increasing their risk of iron deficiency,<sup>17</sup> growth faltering,<sup>18</sup> and choking.<sup>19</sup> In this secondary analysis, zinc intakes and food sources of zinc at 7 and 12 months of age, and biochemical zinc status at 12 months of age, are reported in infants following BLISS compared to traditional spoon-feeding.

## MATERIALS AND METHODS

### Study Design and Participants

Detailed methods for the BLISS study have been described elsewhere.<sup>20</sup> Participants were recruited into this two-arm randomized controlled trial between November 2012 and March 2014. The study was approved by the New Zealand Lower South Regional Ethics Committee (LRS/11/09/037), and adult participants gave written informed consent. Pregnant women who had enrolled with Queen Mary Maternity Hospital in Dunedin, New Zealand (the only birthing facility in the Dunedin area) during their pregnancy were invited into the study when they reached their third trimester. Potential participants were eligible if they spoke English or Te Reo Māori (indigenous language of New Zealand); planned to live in the area of Dunedin, New Zealand, until their child was at least 2 years of age; and were 16 years of age or older.

### RESEARCH SNAPSHOT

**Research Question:** Are infants following a modified version of Baby-Led Weaning at an increased risk of inadequate zinc intakes and zinc deficiency compared with infants following traditional spoon-feeding?

**Key Findings:** In this randomized controlled trial, the zinc intakes of infants following a modified version of Baby-Led Weaning were not different than those of infants following traditional spoon-feeding at either 7 or 12 months of age. There was also no statistically significant difference in biochemical zinc status between the groups at 12 months of age. This suggests that infants following a modified version of Baby-Led Weaning are able to achieve similar zinc intake and status to infants following traditional spoon-feeding.

Exclusion criteria were if their infant was born before 37 weeks' gestation or had a congenital abnormality, physical condition, or intellectual disability that was likely to affect his or her feeding or growth. Once consent was obtained, the parent participant was randomized into one of two groups via a sequentially numbered opaque envelope. Randomization was achieved using random length blocks, stratified by parity (first child, subsequent child) and maternal education (tertiary, nontertiary), by the study biostatistician.

### Intervention and Adherence

Participants in the Control and BLISS groups received the standard midwifery and "well child" care that is available to all New Zealand children from birth to 5 years of age (this typically includes assessments of growth and development, as well as information on breastfeeding, nutrition, parenting, and health and safety).<sup>21</sup> Participants in the BLISS group also received support and education from before birth until 9 months of age on following the BLISS approach. The BLISS approach was based on the main principles of BLW with some modifications to address concerns expressed by health professionals about this method of complementary feeding, namely the proposed potential for increased risk of: iron deficiency, growth faltering, and choking.<sup>6,9</sup>

The three main components of the BLISS intervention were:

1. Five contacts with an International Board-Certified Lactation Consultant (from the third trimester of pregnancy to 6 months postpartum) to encourage and support exclusive milk feeding (ideally breastfeeding) and delay the introduction of complementary foods until 6 months of age.
2. Three contacts with BLISS research staff (at 5.5, 7, and 9 months) to give individualized advice on how to follow BLISS, particularly the infant feeding themselves from the start of complementary feeding (ie, a baby-led approach to introducing solids) and family foods being offered as finger foods so the infant can pick them up. The majority of the advice was given at 5.5 months, with further individualized advice at 7 and 9 months as the infants developed.

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