The Timing of Initiating Complementary Feeding in Preterm Infants and Its Effect on Overweight: A Systematic Review

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Keywords

Preterm infants · Complementary feeding · Obesity · Overweight

Abstract

Background: What is the appropriate time to start complementary feeding for preterm infants? The answer to this question is yet under debate. The timing of initiating complementary feeding may be associated with overweight in term infants. This systematic review aimed to study the effect of the timing of initiating complementary feeding on overweight in preterm infants. Predefined search items included preterm infants, complementary feeding, overweight, and their synonyms. **Summary:** The search identified 15,749 articles, of which 5 articles were included. Three studies presented data of randomized controlled trials and 2 studies were cohort studies. Two randomized controlled trials found no significant difference in body mass index (BMI) Z-score between the intervention groups at 12 months of age. One randomized controlled trial presented a significant greater mean rate of growth in length per week until 12 months in the preterm weaning strategy-group compared with the current best practices. One observational study

concluded that each month the infants received complementary food later, the Z-score for length and weight was reduced by 0.1. **Key Messages:** No clear conclusion could be drawn from the included studies. This review illustrates the need for further research to assess the effect of the timing of initiating complementary feeding on overweight in preterm infants.

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Introduction

In term infants, very early start of complementary feeding (at or before 4 months of age), rather than at 4–6 months or >6 months, may be a determinant for childhood obesity [1–3]. Complementary feeding is defined as the period during which infants make a gradual transition to eating family foods [4, 5]. Timely introduction of complementary feeding during infancy is necessary

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Table 1. Keywords used in database without Medical Subject Headings (MeSH) terms

Subject	Keywords
Preterm	Preterm; Prematurely; Premature; Prematurity
Child	Baby; Babies; Neonate; Neonates; Infant; Infants; Infancy; Child; Children; Childhood; Juvenile; Newborn; Offspring; Suckling; Toddler; Toddlers; Schoolchildren; Pediatric; Paediatrics; Paediatric; Girl; Girls; Boy; Boys; Youth; Youths; Preschool-child; Minor
Complementary feeding	Weaning; Weaned; Feeding; Feed; Family Foods; Family Food; Complementary feeding; Complementary feedings; Solid feeding; Solid food; Solid foods; Food; Enteral food; Additional food; Additional foods; Additional feeding
Overweight	Overweight; Obesity; Obese; Obesitas; Heavy; Growth; Body mass index; BMI; Body composition; Adiposity; adipositas; Childhood obesity; Excessive weight; Weight gain; Weight-gain; Overweight; Weight change; Overeating; Overnutrition; Body-Weight; Body weight changes; BMI-SDS; SDS-BMI; Body Weight; Weight; Childhood obesity; Paediatric overweight; Pediatric overweight; Childhood overweight

for both nutritional and developmental reasons [6]. For term infants, both the American Academy of Pediatrics (AAP) and the World Health Organization suggest that infants for the first 6 months be exclusively breastfed in order to achieve optimal growth, development, and health [7–10]. The European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) recommends that the introduction of complementary feeding be delayed until at least 17 weeks of age, but no later than 26 weeks, acknowledging exclusive or full breastfeeding until 6 months as a desirable goal [11].

So far, there are no clear recommendations for preterm infants (born before a gestational age of 37 weeks) on the timing of initiating complementary feeding. The recommendations for term infants cannot be directly translated to preterm infants. The body composition of preterm infants at term equivalent age is not comparable with term infants [12]. Babies born preterm are more likely to be growth-restricted compared with babies with an equal gestational age who remain in utero and are born at term age [13]. Furthermore, preterm infants are a vulnerable group who have increased nutritional requirements, are at risk of developing gastro-esophageal reflux, respiratory problems, and have delayed early gross motor development. Therefore, delayed introduction of complementary feeding may result in insufficient nutritional needs [14, 15]. In addition, the introduction of solid foods assists speech development, as well as the acceptance of a variety of foods and structures [14, 15]. On the other hand, since some suggest that very early introduction of solids in term infants is associated with rapid weight gain and childhood obesity, it raises the question about the optimal timing of solids in preterm infants and the effect on overweight [2, 3, 14–17].

Taking into account the high prevalence of childhood overweight and obesity and its consequences, the first few months after birth, in which complementary feeding can be started, may be an important window. Hence, it is necessary to analyze the effect of the timing of complementary feeding on overweight in preterm infants. The aim of this systematic review is to summarize the effect of the timing of initiating complementary feeding in preterm infants on overweight (including obesity).

Methods

Methods of the analysis and inclusion criteria were specified in advance and documented in a previously published protocol [18]. This systematic review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol 2015 [19].

Search Strategy

An electronic systematic literature search was conducted in Cochrane, Pubmed, Embase, Web of Science, Scopus, and CINAHL. The search was done using predefined search terms, including preterm infants, complementary feeding, overweight, and their synonyms, and included publications up to August 4, 2017 (Table 1) [18]. There was no restriction for time period. The search was limited to articles in English, French, German, Spanish, or Dutch. Animal studies, expert opinions, editorials, poster presentations, book chapters, letters to the editor, and protocols were excluded.

Literature Selection

This review was limited to studies examining preterm infants, defined as infants born before 37 weeks of gestational age. Studies were included when investigating the timing of initiating complementary feeding. Complementary feeding was defined as the process of introducing any non-breast milk foods or nutritive liquids [8, 10]. The primary outcome was measured height and weight. To account for sex- and age-related changes over time, BMI-standard

deviation score (BMI-SDS or BMI Z-score) and percentage overweight were used to compare studies. In case BMI-SDS or BMI Z-scores were not reported and calculation or extraction was not possible, the authors were contacted. If BMI-SDS or BMI Z-scores were not available anyhow, the absolute change in BMI was used as second best outcome variable. Data from randomized controlled trials (RCTs) and cohort studies, both prospective and retrospective, were included. There was no minimum length of follow-up required.

After electronic searching, the records were inserted into a database set up by EndNote software. Duplicates were removed automatically and manually. The retrieved studies were screened independently by 3 reviewers (K.M.V., A.J.J., and E.J.M.F.) using www.covidence.org. First, the titles of the retrieved studies were screened. Second, abstracts of the remaining studies were screened. Irrelevant studies were excluded. Afterwards, full-text screening was performed and the Risk of Bias Tool was filled in by 3 reviewers independently (K.M.V., A.J.J., and E.J.M.F.) [20–22]. The risk of bias was taken into account using a risk of bias tool assessing selection bias, performance bias, detection bias, attrition bias, reporting bias, or any other form of bias. Disagreements were resolved by discussion. Additionally, a related article search was performed and cross-references of the relevant references were checked. Furthermore, ClinicalTrials.gov, The European Union Clinical Trials Register, and the Netherlands Trial Register were searched.

From the remaining full-text articles, data were extracted by K.M.V. An Excel data extraction form was used, summarizing data on characteristics of the included studies, publication details, domain, determinant, and outcome.

Results

Search Results

The literature search yielded 15,749 articles, of which 6,599 were duplicates (Fig. 1). After the screening of the title and abstract, 35 articles were selected for full-text screening. Thirty-one articles were excluded because of incorrect study design, language other than English, French, German, Spanish, or Dutch, or incorrect domain, determinant, or outcome. One study was found through other sources. The remaining 5 articles, that included 1,707 patients, met the inclusion criteria for the systematic review and were selected for risk of bias assessment.

Methodological Quality Assessment

The methodological quality of the 5 included studies is presented in the risk of bias table (Table 2). Marriott et al. [23] had an unclear risk of bias. This study used pooled study data of a prospective randomized dietary trial in combination with unpublished data. The corresponding author was contacted by email. Unfortunately, it was not possible for the authors to reconstruct the full database or give more information on the unpublished data, so no

more information on the risk of bias could be obtained. Sun et al. [24] were also contacted by e-mail to obtain more information on the preterm infants that they included in their cohort. They could not specify whether the age of introducing solids was the corrected or uncorrected age, leading to a major impact on the item information bias [24].

Results

The characteristics and key findings are summarized in Table 3. The primary outcome of Gupta et al. [28] was weight for age Z-score at 12 months corrected age but also provided data on BMI for age Z-score at 12 months corrected age. Sun et al. [24] also presented data in BMI Z-score at 1 year of age (corrected or uncorrected age). The 3 other included studies did not present their data in BMI-SDS or BMI Z-score or in an absolute change of BMI. For that reason, comparable outcome variables were searched for a systematic reporting. Unfortunately, sufficient comparable outcomes were lacking, so the presented results could not be synthesized through meta-analysis. Consequently, a systematic review was undertaken.

Marriott et al. [23] assessed in a blinded RCT the effect on growth in preterm infants and compared a specially devised preterm weaning strategy (PWS) with current best practices in infant feeding as control group. Marriott et al. [23] presented results in weight gain (gram per week) until 12 months combined with mean and SDS of weight, length, and head circumferences. The PWS-group was introduced to semisolid foods soon after 13 weeks postnatal age, when they were with a minimum weight of 3.5 kilograms, whereas the control group was introduced to semisolid foods soon after 17 weeks postnatal age, when they were with a minimum weight of 5.0 kilograms. The PWS group received foods with a higher energy density and higher protein content compared to the control group. Marriott et al. [23] reported a significant greater mean rate of growth in length per week in the intervention group (I) compared to control group (C: mean 5.1 mm/week (SE 0.07) vs. C: mean 4.9 mm/week (SE 0.10); $p = 0.04$) after 12 months. In the intervention group, more infants received breast milk fortifier ($p = 0.02$). No significant differences in mean or SDS of weight per week were found at any assessment point. Noteworthy, the PWS-group mentioned in the study by Marriott et al. [23] had a significant greater mean rate of growth in length per week compared to the controls, but in this group, more infants received breast milk fortifier ($p = 0.02$), which could have influenced the results.

Fig. 1. Flowchart of the search and selection process.

Morgan et al. [25] used combined data from 5 prospective randomized trials conducted in the United Kingdom. Two trials involved preterm infants, of which 1 trial contained unpublished data, with a total of 467 preterm infants. No significant difference in weight and length from 12 weeks until 9 months post-term between early (≤ 12 weeks) versus late (>12 weeks) weaning was reported; also, they did not find a difference in a subpopulation at 18 months. Those weaned before 12 weeks did show a

significantly greater gain in subscapular skinfold thickness gain ($p = 0.02$) but not in triceps skinfold thickness [25].

The prospective observational study of Spiegler et al. [26] reported growth in length and weight using Percentiles of Rosario and calculated Z-scores with a follow-up time of 24 months [27]. They found that for each month the infants received complementary food later, the Z-score for length (cm) and weight (kg) was reduced by -0.1

Table 2. Risk of bias assessments for studies

	Type of study	Selection bias	Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias
Marriott 2003	RCT	–	–	–	–	?	+
Morgan 2004	Pooled from RCT's	?	?	–	?	?	+
Spiegler 2015	Cohort	+/-	+/-	–	–	–	?
Sun 2016	Cohort	–	–	–	+/-	+/-	+
Gupta 2017	RCT	–	–	–	+	–	–

–, low risk of bias; +/-, moderate risk of bias; + high risk of bias; ?, unclear risk of bias.
RCTs, randomized controlled trials.

at the age of 2 years, leading to the conclusion that the infants appeared to benefit from the early introduction of complementary feeding [26].

Sun et al. [24] found that the early introduction of solids (≤ 4 months versus 6 months of age) seemed to be associated with decreased odds of above-normal BMI, after adjusting for socioeconomic status, maternal place of birth, any siblings, maternal smoking during pregnancy, and birth weight (adjusted OR 0.5, 95% CI 0.05–5.5).

The well-designed study of Gupta et al. [28] randomized between initiating complementary feeding at 4 months or at 6 months corrected age. They found no significant difference in BMI Z-scores (mean -1.0 , SD 1.0 in the 4 month group vs. -0.9 , SD 1.1 in the 6 month group, $p = 0.561$); also, they did not find a significant difference in other growth parameters. Prominently, they found that 18% of the infants in the 4-month group required hospital admission during the study period, compared with 9% of the infants in the 6-month group (relative risk 1.9, 95% CI 1.1–3.3; $p = 0.01$) [28].

Discussion

This systematic review focused on the timing of initiating complementary feeding in preterm infants and the effect on overweight, including obesity. In total, 5 studies were found with information on growth. Two studies presented data on the outcome of interest, but one had invalid data, since the preterm group was not their main interest. Unfortunately, no information about BMI Z-score, BMI-SDS, or absolute BMI-change could be extracted or calculated from the other 3 included studies, despite contacting the corresponding authors. Because of the inconsistency in outcome of the included studies, a meta-analysis was not possible, and therefore, a systematic review was carried out.

Gupta et al. [28] and Sun et al. [24] found no significant difference in BMI Z-score at 1 year between early and late introduction of solid foods, using the same growth standards [29]. Spiegler et al. [26] concluded that preterm infants may benefit from early introduction and Marriott et al. [23] concluded that the early introduction of complementary feeding would lead to a significant greater mean rate of growth in length per week.

The 5 studies are heterogeneous. First, the study population is different. The studies by Marriott et al. [23] and Morgan et al. [25] are related to premature children in the intervention and the control group, born before 37 weeks gestational age. The study by Spiegler et al. [26] includes a prospective cohort of extremely and very premature born children, with term children as a control group. However, our outcome of interest, the start of complementary feeding, was not compared with that of the control group of term children. Sun et al. [24] defined preterm infants as those born before 36 weeks of gestation and Gupta et al. [28] randomized infants as those born in less than 34 weeks of gestation.

Second, the classification of early versus late start of complementary feeding in the RCTs is different. Marriott et al. [23] compared the introduction of solids at 13 weeks postnatal age with 17 weeks postnatal age. Morgan et al. [25] compared weaning before and after 12 weeks post-term and Gupta et al. [28] compared 4 versus 6 months post-term. Sun et al. [24] could not specify whether the age of introducing solids in their preterm subcohort was the corrected or uncorrected age of 4 versus 6 months.

Previous reviews of Palmer et al. [14] and King suggest that the corrected age of 3 months (i.e., 13 weeks post-term) may be an appropriate age to commence the introduction of solid foods for the most preterm infants [15]. The AAP recommended in 2007 that solid foods should be introduced based on oral-motor readiness, which is

Table 3. Overview of characteristics, domain, determinant, and outcome parameters, including results

Study	Study design	Country	n (I vs. C)	Follow-up	Preterm infants definition	Mean age	Ethnicity	Time of starting complementary feeding	Definition of complementary feeding	Type of other feeding	Definition	Time-points	Missings, Results n
Marriott et al. [23], 2003	Prospective RCT	UK	68 I: 37 C: 31	12 mo	GA <37 wk, BW <2,200 g	I: 31.2 wk C: 31.6 wk	European and Asian	I: 13 weeks postnatal and 3.5 kg C: 17 weeks postnatal and 5 kg	I: semisolid foods. Energy density in range 300–450 kJ/100 g; protein content 2.5–5.0 g/100 g C: semisolid foods. Energy density in range 250–450 kJ/100 g; protein content 1.5–5.0 g/100 g	Breast milk fortifier for preterm infants with BW <2,000 g	Growth in length (mm/week); weight (g/week); head circumference (mm/week) and SDS for length, weight, and head circumference	0, 6, 12 months post-term	3 Growth between 0 and 12 months. * Weight (g/wk) I: mean 121.0 (SE 3.1) C: mean 119.6 (SE 4.8) Not significant * Length (mm/wk) I: mean 5.1 (SE 0.07) C: mean 4.9 (SE 0.10) p = 0.04
Morgan et al. [25], 2004	Data from 5 prospective randomized trials	UK	467 I: 365 C: 102	18 mo	GA <37 wk, BW <1,875 g	N.M.	N.M.	I: weaning <12 weeks post-term C: weaning >12 weeks post-term	Solid foods	Term formula, post-discharge formula, preterm infants formula, long chain polyunsaturated fatty acid	Weight gain (kg), head circumference (cm), gain (cm), skinfold gain (mm)	12 weeks, 26 weeks, 9 months and 18 months post-term	N.M. Between 12 weeks and 9 months post-term: * Weight gain (kg) I: mean 8.25 (SE 0.05) C: mean 8.37 (SE 0.07) Not significant * Length gain (cm) I: mean 70.3 (SE 0.16) C: mean 70.6 (SE 0.2) Not significant
Spiegler et al. [26], 2015	Prospective cohort with retrospective questionnaires, compared with term control-group	GER	682	24 mo	GA 22+0 – 32+6, BW <1,500 g	N.M.	N.M.	Via retrospective questionnaires	Introducing vegetables, meat, fibers, family meals in weeks	N.M.	Birthweight (kg) and birth length (cm). Height (cm, Z-score) and weight (kg, Z-score) at 2 years post-term age	24 months post-term	0 Each month the infants received complementary food later, was associated with a decrease of the Z-score for length and weight. Effect of age at introduction solid food (months): * Weight (kg): –0.1 difference in Z score * Length (cm): –0.1 difference in Z score
Sun et al. [24], 2016	Prospective cohort study	AUS	268 of which 177 with complete data	12 mo	GA <36 wks	N.M.	N.M.	Via self-administered retrospective questionnaires	Solid foods, divided in 5 categories (<4, 4, 5, 6, and >7 months of age) Note: corrected or uncorrected age not specified	Breastfeeding, bottle feeding, cow's milk	Age- and sex-specific BMI Z-scores (WHO) – Normal BMI Z score <2 – Above normal BMI Z-score of >2 Weight and length provided by the guardian	1 year ± 3 months	91 * Age of introduction of solids: <4 months: 19.9%; 5 months: 26.9%, 6 months: 45.2%; >6 months: 8.2%. * Association between age of introduction and above normal BMI at 1 year of age: <4 mo vs. 6 months: Adjusted OR 0.5 (0.05–5.5)

Table 3. (continued)

Study	Study design	Country	n (I vs. C)	Follow-up	Preterm infants definition	Mean age	Ethnicity	Time of starting complementary feeding	Definition of complementary feeding	Type of other feeding	Definition	Time-points	Missings, Results n
Gupta et al. [28], 2017	Prospective RCT	IND	403 (373) 4 mo: 206 (184) 6 mo: 197 (189)	12 mo	GA <35 wks No major malformation. Residing within 60 km of study hospital. Not expected to move away within 1 year.	4 mo: 31.7 wk 6 mo: 31.5 wk	N.M.	4 months corrected age versus 6 months corrected age	Semisolid, soft, or solid foods other than breastmilk, formula or animal milk	Breastfeeding, mixed feeding, animal feeding or formula feeding	Weight for age Z-score (WAZ), animal feeding based on WHO-MGRS growth standards	12 months post-term	4 mo: 29 6 mo: 17 * WAZ at 12 months: 4 mo: mean -1.6 (SD 1.2) 6 mo: mean -1.6 (SD 1.3) p = 0.965 Mean diff 0.005 (95% CI -0.24 to 0.25) * BMI for age Z-score at 12 months 4 mo: mean -1.0 (SD 1.0) 6 mo: mean -0.9 (SD 1.1) p = 0.561 * Length for age Z-score at 12 months 4 mo: mean -1.6 (SD 1.2) 6 mo: mean -1.6 (SD 1.3) p = 0.491

Bold value indicate significance. AUS, Australia; BW, birth weight; cm, centimeter; GER, Germany; g, gram; I vs. C, intervention vs. control; IND, India; kg, kilogram; mm, millimeter; N.M., not mentioned; mo, months; RCT, randomized controlled trial; UK, United Kingdom; wk, weeks.

usually achieved at a corrected age of 4–6 months [16]. In addition, in 2014, they gave the conflicting advice to consider complementary feeding in preterm infants at 4 months' chronologic age (uncorrected age), but in the same article also recommended that complementary foods can be introduced between 4 and 6 months' corrected age [30]. Gupta et al. [28] gave a clear rationale for choosing a 4- and 6-month group in the supplementary appendix. They translate the ESPGHAN recommendations for term infants (i.e., start complementary feeding at 4–6 months of age) into the corrected age for preterm infants. The translation of the guidelines for term born infants, which is also still under debate, into preterm guidelines is challenging and in view of body compensation not possible, since body compensation at term equivalent age of infants born preterm is different than that of infants born at term [12].

Worth considering is that the EPSGHAN find no evidence against starting complementary feeding at 4 months (versus 6 months) of age looking at multiple outcomes. Then again, they do still consider exclusive or predominant breastfeeding for approximately 6 months a desirable goal.

In view of these reviews, Marriott et al. [23] choose a very early time of introduction of solid foods, considering that the mean gestational age was 31.4 weeks, leading to the introduction of semi-solid foods at 4 weeks post-term for some infants. This could have led to selection bias because it is more likely for children without co morbidities to accept early introduction of solids.

Spiegler et al. [26] showed that earlier introduction of complementary feeding was associated with increased height and weight at a post-term age of 2 years. It is worth mentioning that Spiegler et al. [26] drew these conclusions based on available information of only 18% of the children of the total study population. Questionnaires were collected retrospectively, which could have led to recall bias. They concluded that each month preterm infants received complementary food later was associated with a decrease of the Z-score of length and weight of -0.1. However, these differences are of minor clinical relevance. Unfortunately, this study only shows Z-scores of length and weight, but does not show whether the participating children are with correct weight or are overweight. Furthermore, Spiegler et al. [26] included preterm infants born between 22 + 0 and 32 + 6 weeks of gestation. Yet, a retrospective study of Vasylyeva et al. [31] aiming to identify significant risk factors in prematurely born children leading to the development of obesity during late childhood and adolescence periods, found

that among preterm babies, the highest risk of developing obesity during childhood and the adolescent period is the possibility of babies being born at a more advanced gestational age. Furthermore, a very early gestation age is associated with multiple comorbidities, leading to a decrease in growth. So, a similar study like Spiegler et al. [26], including preterm infants with a more advanced gestational age, in most cases corresponding with less comorbidities, could have found a more clinically relevant difference on height and length.

Remarkably, the hypothesis of Spiegler's study differs from previous reported studies. Spiegler et al. [26] were concerned that early introduction might be associated with reduced length or weight at 2 years of post-term age. In contrast, previous studies had their concern about the early start of complementary feeding being a risk factor for childhood obesity [2, 3]. Their reason for this concern is that complementary food is less energy dense and that the infants need to consume more volume to meet their energy needs [26]. For that reason, Spiegler et al. [26] arrived at the conclusion that early introduction of complementary food did not negatively influence length or weight at 2 years of age but even had a small positive effect in their cohort, since early introduction of complementary feeding resulted in an average weight gain of 100 g in 2 years of age.

Gupta et al. [28] recommends the initiation of complementary feeding at 6 months over 4 months corrected age in infants less than 34 weeks of gestation, based on the higher rate of hospital admission in the 4-month group. The hospital admission rate is remarkable. This might be explained by the potential contamination of complementary foods due to inadequate hygiene leading to an increased risk of pathogen exposure in India, since diarrhea was one of the main reasons for hospital admission. For that reason, generalizability to high-income countries should be questioned [28, 32]. Nevertheless, the ESPGHAN committee pointed out that some observational studies suggest that even in high-income settings with access to clean water supplies and safe complementary feeding, more prolonged exclusive breast-feeding may protect against infection and hospitalization for infection in infants [11].

Strengths and Limitations

The aim of this systematic review was to analyze the effect of the timing of initiating complementary feeding on overweight (including obesity) in preterm infants using a predefined methodology [18]. To our knowledge, this is the first systematic review on the timing of com-

plementary feeding in preterm infants and the effect on (over)weight. Multiple synonyms for growth were used, so a different search would not have led to different results in outcome. A possible limitation of this systematic review is the search restriction for preterm infants. Despite the fact that we also searched for Medical Subject Headings-terms, we could have missed studies in which subgroup analysis of preterm infants were done, without mentioning this in the title or abstract. Another limitation of this review is the inability to perform quantitative summaries. Due to the number of studies, publication bias could not be formally analyzed. In our view, the risk of publication bias is very negligible, since this systematic review does not concern a pharmaceutical question nor did we have a search restriction for languages.

Worldwide, more than 1 in 10 babies are born preterm [5]. Research has pointed out that preterm infants are significantly more likely to be introduced to solid foods earlier compared with term infants. Observational studies have pointed out that preterm infants start complementary feeding between 11.5 and 15.1 weeks corrected age [33–36]. Even though a large amount of children are born premature every year, this systematic review shows that well-designed studies on which guidelines about the timing of initiating complementary feeding in preterm infants and the effect on overweight can be based are lacking.

Summary

This systematic review on the timing of initiating complementary feeding in preterm infants found 5 intervention and observational studies with information on growth. Even though many preterm children are born, studies about the timing of complementary feeding do not lead to clear conclusions. In view of the lack of guidelines for preterm infants about the start of complementary feeding and the increasing incidence of overweight, a well-designed randomized control trial will provide more insight on the effect of the timing of complementary feeding on (over)weight in preterm infants.

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Disclosure Statement

The authors declare that they have no conflicts of interest to disclose.

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Author Contributions

K.M.V., E.J.M.F., A.J.J., and J.B.G. participated in the design of the systematic review. E.J.M.F., A.J.J., and K.M.V. independently screened all selected titles, abstracts, and full-text articles. K.M.V. extracted the data. E.J.M.F., A.J.J., and K.M.V. interpreted all available data. K.M.V. wrote the first draft of the article and A.J.J. corrected the first draft. All authors read and approved of the final manuscript.