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Components of basic feeding rule for infants aged 6-24 months: a scoping review

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ABSTRACT

Introducing complementary foods at six months helps supplement nutrients and address potential eating challenges in infants. Childhood eating difficulties can contribute to growth issues. This scoping review aimed to identify the components of feeding rules for infants aged 6-24 months. A systematic search of three electronic databases yielded 5,174 abstracts, with 18 complete articles assessed for eligibility. After eliminating 8 articles, 10 met the criteria. The feeding rules comprise three main components: schedule, environment, and procedure. Adhering to these basic rules can enhance a child's growth rate and reduce the risk of failure to thrive. Responsive feeding is closely linked to these rules, categorized based on feeding schedule, procedures, and environment. Hence, it is crucial for healthcare professionals to provide counseling on the fundamental principles of complementary feeding.

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1. INTRODUCTION

One of the sustainable development goals (SDG) aim by 2030 is to end hunger, achieve food security and nutrition that better supports sustainable agriculture [1], [2]. Children who are given good food during periods of food other than breast milk, namely for ages 6-24 months, will grow into children with optimal growth and development [3]–[6]. The complementary food is given to babies who are six months or 180 days old. The purpose of complementary food is to introduce new foods to babies other than breast milk. Another aim of giving complementary food is to increase energy and essential nutrients which decrease in breast milk [7], [8].

Difficulty eating is a problem in children that needs to be paid attention to by both parents and health practitioners, because difficulty eating in children has a detrimental effect on the child's next stage of growth and development. Disadvantages can include weight gain or inappropriate height, nutritional deficiencies and reduced nutritional intake in children which can lead to food deficiencies [9]–[12]. Difficulty eating in children is often associated with failure to thrive in children. Failure to grow is generally caused by organic and non-organic factors. Organic factors include abnormalities in anatomical structure, digestive system, metabolic disorders, mechanical obstruction, cranial nerve damage, food allergies and dysphagia. Non-organic factors include psychosocial factors, parents' inability to provide adequate food intake, as well as ignorance/misinformation about feeding [13], [14].

Mothers play an important role in the process of forming children's eating patterns. Diet is the most important behavior that influences nutritional conditions. Mothers must have the basic ability to prepare the quality and quantity of food and drinks they consume towards consuming balanced nutrition for their children [15]–[19]. In general, nutritional problems in children are the impact of an imbalance between intake and output of nutrients (nutritional imbalance) in the form of chronic diseases, excess body weight, allergies and malnutrition. Malnutrition in toddlers not only affects physical growth disorders, but will also affect the quality of intelligence and development in the future [20].

To overcome errors in feeding practices, Chatoor [21] created basic feeding rules which are called basic feeding rules. Basic feeding rules are structured feeding rules which include three aspects, namely schedule, environment and feeding procedures. By implementing basic feeding rules, the child's growth rate will be good and the risk of experiencing growth failure can be reduced. Feeding rules are closely related to responsive feeding. Responsive feeding is a feeding behavior that applies the principles of psychosocial care which includes components of feeding rules, namely schedule, environment and feeding procedures [14]. Therefore, this scoping review study aim was to maps the components of the feeding rule for infants aged 6-24 month.

2. METHOD

2.1. Search strategy

This scoping review search came from three databases: Science Direct, Google Scholar and PubMed. The process of collecting this review article uses specific clinical questions, namely with population, concept, and context (PCC). Population (P) is children (aged<18 years) and concept (C) is related to feeding rules and context (C) in community settings. We use several keywords with Boolean searches, namely basic feeding rule OR feeding guideline OR feeding style for toddler OR child. The selection of articles in this study followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) method [22], [23].

2.2. Inclusion and exclusion criteria

The inclusion criteria in this study were articles: i) articles that explain feeding rules; ii) open access articles, full text; iii) original article or research article. The exclusion criteria in this study were that the article discussed children with certain conditions/comorbidities and articles that were protocol studies. All authors performed a first screening and conducted content analysis of the articles.

2.3. Study selection

All articles were first screened for research outcomes through abstracts, and detailed findings were reviewed in full text to assess the methodology, research outcomes, and conclusions as shown in Figure 1. Data extraction was performed using the PRISMA flow diagram to review study characteristics and the level of evidence for each article. An analysis of the evidence and an evaluation of the identified articles were conducted according to the flow diagram. The initial keyword-based literature search yielded a total of 5650 articles. After review, 5,174 articles were eliminated due to reasons such as the population not aligning with the research objectives, articles not in English, and not being open access, leaving 18 complete articles assessed for eligibility. Of these, eight articles were eliminated, resulting in 10 articles that met the eligibility criteria.

2.4. Data extraction and analysis

For this systematic review, essential information pertinent to the research question was systematically gathered. The extracted data included the author, year of publication, country of origin, aim, population and sample size, methods, and key findings. These elements provided comprehensive insights into each study's context and outcomes. To synthesize this data, we employed a narrative approach. This involved systematically collecting and organizing information from multiple studies to assess the effectiveness of various interventions. We then developed a clear and structured written account that summarized and explained the collected data.

2.5. Assessment of study quality and risk of bias

Before assessing the quality of the articles, the writing team read the ten complete texts of the selected articles. After the team finished reading the article, the team carried out a critical appraisal using the Joanna Briggs Institute (JBI) critical appraisal checklist for analytical cross-sectional, case control, randomized controlled trial, quasi experimental, cohort, and qualitative studies. Ten articles were assessed for quality using the JBI critical appraisal checklist, all articles met the criteria. No articles were excluded based on quality appraisal.

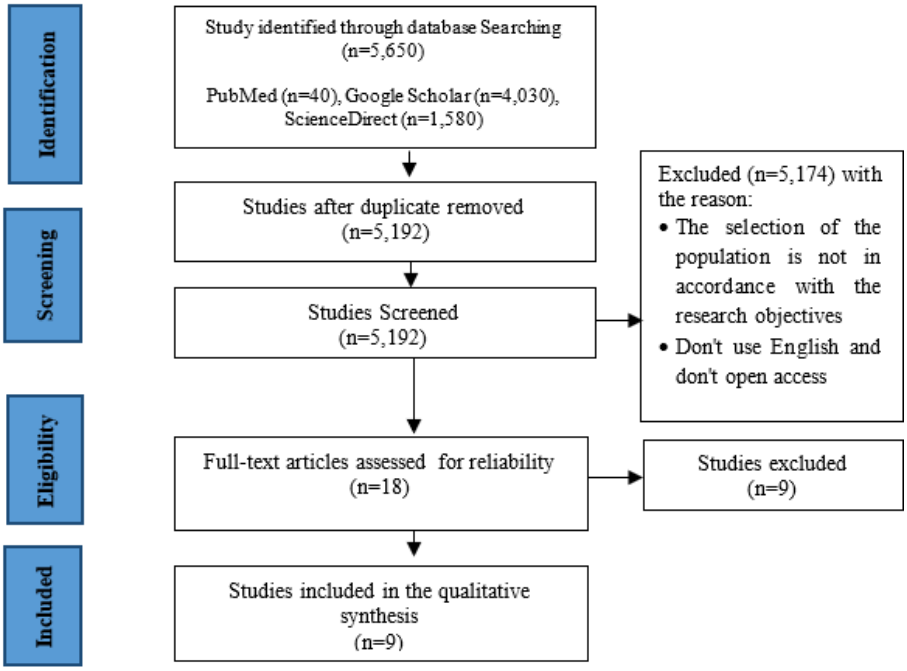

Figure 1. PRISMA flowchart

3. RESULTS AND DISCUSSION

3.1. Characteristics of study

This systematic review exhibits heterogeneity, with nine articles from various setting and study design, including two articles from Indonesia, one article from Ethiopia, one article from Soweto, one article from Rwanda, two articles from United States, one article from Australia, and one article from Chile. Furthermore, the selected articles study design consisted of one article was experimental study, four articles was cross-sectional study and four articles was qualitative study. The characteristics of the study are described in Table 1 and 2.

3.2. Thematic findings

(i) Feeding schedule. The studies indicate a positive shift in feeding schedules, reflected in increased knowledge about various food-related issues and addressing eating problems in children. While not explicitly detailed, the observed decrease in picky eaters and small eaters suggests an improvement in the overall feeding schedule [24]–[26].

(ii) Feeding environments. Positive changes in feeding environments are implied through the observed decrease in picky eaters and small eaters, indicating a more supportive and diverse atmosphere. Specifics on environmental modifications are not explicitly outlined, the findings suggest an overall improvement in the feeding environment [27]–[29].

(iii) Feeding procedures. The studies highlight a positive impact on feeding procedures, particularly with the increase in knowledge about food-related issues and addressing eating problems in children. Details about altered feeding procedures are not explicitly provided, the overall positive trend suggests a beneficial impact on feeding practices [30]–[32].

Table 1. Included articles characteristics

No	Authors and year of publication	Citation	Country	Continent
1.	Rahayu *et al*., (2021)	[24]	Indonesia	Asia
2.	Purnamasari *et al*., (2023)	[25]	Indonesia	Asia
3.	Gebretsadik *et al*., (2023)	[26]	Ethiopia	Africa
4.	Wrottesley *et al*., (2019)	[27]	Soweto	Africa
5.	Dusinginzimana *et al*., (2020)	[28]	Rwanda	Africa
6.	Lindsay *et al*., (2020)	[29]	United States	America
7.	Byrne *et al*., (2021)	[30]	Australia	Australia
8.	Espinoza *et al*., (2022)	[31]	Chile	America
9.	Ayers *et al*., (2019)	[32]	United States	America

Table 2. Articles synthesis

No	Citation	Design	Sample size	Findings
1.	[24]	Quasi experimental study	41 Participants	Post-community service, knowledge about food-related issues and children's eating problems has increased. Furthermore, picky eaters and small eaters has decreased.
2.	[25]	Cross-sectional study	68 participants	A correlation exists between mothers' knowledge of feeding rules and toddlers' nutritional status. Healthcare professionals should offer pre-complementary feeding awareness sessions and counseling during integrated health post activities to enhance mothers' understanding of feeding rules.
3.	[26]	Cross-sectional study	1,651 participants in Kersa, 688 in Mana and 914 in Dedo, Ethiopia	The research shows low prevalence of factors affecting optimal child feeding practices. Key factors include socio-economic status, education, child age, maternal knowledge, and family size. Predictors include maternal education, family size, residence, and agro-ecological knowledge. Multisectoral collaboration is needed to improve maternal education, family planning, and promote agricultural diversification for better complementary feeding practices. Further research on seasonal variations in child feeding practices is advised.
4.	[27]	Cross-sectional study	250 participants in age<6 month and 400 participants in age 6-24 month	The study emphasizes three crucial intervention elements: boosting maternal confidence in exclusive breastfeeding, changing norms around mixed feeding, and involving family members, especially grandmothers and fathers. Prioritizing healthy eating habits in the early years is essential for optimizing health across generations.
5.	[28]	Qualitative study	24 participants	The research shows positive maternal attitudes toward breastfeeding, but suboptimal complementary feeding practices persist due to influential beliefs and perceptions. Despite some nutritional knowledge from counseling, identified views negatively impact food diversity and quantity for children. Addressing these beliefs is crucial for effective practices. Supporting mothers with improved income and food access is essential for effective implementation.
6.	[29]	Qualitative study	21 participants	Fathers are aware of and actively involved in promoting healthy eating for their preschool-aged children. They express a strong desire to learn and do what is right, indicating openness to family interventions.
7.	[30]	Cross-sectional study	88 participants	This first-of-its-kind study in Australia quantitatively assesses feeding practices in early childhood education centers. While policies support responsive feeding, observed and reported data indicate high support for children's autonomy, except for infrequent role modeling. Further research can explore how educators conceptualize and implement feeding practices to understand this gap.
8.	[31]	Qualitative study	25 participants	Using thematic analysis, five factors shaping food parenting practices: parents' past experiences, responses to child characteristics, influence of family members, parental nutrition knowledge, and life context (budgets and time constraints). These influences converge at the family level, emphasizing the need for a family-centered approach to address childhood obesity in Chile.
9.	[32]	Qualitative study	27 participants	Five themes influence feeding practices among immigrant Marshall mothers and daughters at different levels: intrapersonal autonomy, interpersonal influence by families, organizational impact of healthcare providers, and policy-level effects of the special nutrition program for women, infants, and children.

3.3. Basic feeding rules components

Feeding schedule: i) Ensure a regular and planned meal schedule, ii) Meals should last for a duration of 20-30 minutes, 3) Only water consumption is allowed between meal times. Feeding environment: i) Create a pleasant environment, avoiding any coercion for the child to eat, ii) Seat the child in a high chair, iii) The child should remain in the high chair until everyone at the table is full and done eating, iv) Parents should refrain from praising or criticizing the food consumed by the child, v) Avoid providing drinks or television during meals, vi) Do not use food as a reward, vii) Discourage the child from throwing or discarding food or eating utensils, viii) Redirect the child's attention to the meal if there are distractions. Feeding procedures: i) Serve small portions, ii) Introduce solid foods before liquids, iii) Encourage the child to feed themselves, iv) Remove the meal if, after 10-15 minutes, the child is only playing without eating, v) End the meal if the child becomes upset.

3.4. Discussion

This scoping review primary objective was to maps the components of the feeding rule for infants aged 6-24 month. According to literatures, there are three main components of the feeding rules including feeding schedule, feeding environments, and feeding procedure. Each component was discussed.

3.4.1. Feeding schedule

Previous study indicate that mothers often do not follow a fixed schedule for feeding their children and may resort to forcing them to eat, disregarding the child's feeding timetable. This compulsion to eat may involve limiting the child's movement or exerting pressure on the child to consume food [33]–[36]. A positive change in feeding schedules, characterized by an increase in knowledge about various food-related issues and the addressing of eating problems in children, is crucial for promoting healthy feeding practices [24]–[26].

3.4.2. Feeding environments

Previous study revealed that, following the implementation of community service, there was an increase in knowledge about various food-related issues and eating problem. Furthermore, observations on eating issues indicated a decrease in picky eaters and the prevalence of small eaters after community service [24]. Another study also emphasized a correlation between maternal knowledge of feeding rules and toddler nutrition. Thus, when mothers have a better understanding of feeding rules, their introduction of complementary feeding can enhance toddler nutrition [25].

Previous research findings indicate that fathers are aware of and recognize their role in promoting healthy eating for their preschool-aged children. They actively participate in feeding routines, express willingness to engage in family interventions, and have a strong desire to learn and do what is best for their children [29]. Research by Istiyati [37] indicates that fathers involvement is ongoing and active, encompassing frequency, initiative, and personal empowerment across the physical, cognitive, and emotional dimensions of a child's development-encompassing physical, emotional, social, intellectual, and moral aspects. Fatherly parenting contributes a distinct and valuable element to the shaping of a child's character.

Early childhood eating habits are shaped by parental feeding behaviors. In a previous study, various positive and negative/nutritionally unfavorable feeding behaviors were linked to specific characteristics of parents and children. Notably, less educated parents showed a greater inclination to use food for emotional regulation or as a reward, contradicting established feeding guidelines that discourage using food as a reward in the environment [38]–[40].

Prior research indicates that, despite policies endorsing responsive feeding practices, there is a prevalent occurrence of children independently determining their food choices and portions. This is evident in both observed behavior and self-reported data, characterized by low pressure to eat and minimal use of food as a reward. Notably, despite policy support and extensive educator training, the observed frequency of role modeling is reported to be low. Further investigation into educators' conceptualization and implementation of feeding practices can shed light on why this crucial aspect of mealtime is not consistently applied in practice [30].

Feeding rules emphasize creating a comfortable mealtime atmosphere and avoiding coercion when feeding children. Dranesia *et al.* [41] research links pressure during meals to the occurrence of stunting. Thus, it is crucial for parents to foster positive eating behaviors in their children to mitigate such risks [41], [42]. The research conducted by previous study revealed five themes influencing food parenting practices: parents' past experiences shaping current goals, responses to child characteristics, influence of family members (especially grandparents), parental nutrition knowledge, and life context (limited budgets and time constraints) [31].

Mothers' attitudes towards breastfeeding and solid foods influenced their feeding strategies, involving modeling, repeated exposure, and "sneaking" healthy foods. Information sources included pediatricians, female family members, and the internet [43], [44]. Earlier research identified caregivers' knowledge and beliefs regarding the benefits of breastfeeding and timely introduction of complementary foods as key individual factors that support positive infant and child feeding practices [45]–[47].

3.4.3. Feeding procedure

Espinoza *et al*. [31] employed thematic analysis with an inductive approach, revealing parental nutrition knowledge as a theme influencing food parenting practices. A previous study identified factors affecting toddlers' nutritional status, including maternal education, nutritional knowledge, maternal behavior, and the timing of introducing complementary feeding [48]. Caregivers' preference for liquids over semi-solid foods hampers good feeding practices. While community-based nutritional programs effectively promote optimal feeding practices at the group level, household poverty in rural areas remains a barrier. The study underscores the necessity of empowering caregivers with clear guidelines, particularly concerning complementary feeding alongside breastfeeding [47].

In Southwest Ethiopia, a study found cereals to be the primary dietary item, with legumes and nuts most consumed across regions and the highest meat consumption in the lowland region. In Soweto, common non-responsive feeding practices were linked to the development of unhealthy food relationships and poor eating behaviors. Responsive feeding, such as using consistent food to please, correlated with faster weight gain between 6 and 18 months [27], [49], [50]. However, limited research exists on the correlation between

childcare centers, provider characteristics, feeding styles, and the nutrition and weight status of very young children. This gap impedes evidence-based interventions for childhood obesity prevention in early childhood education settings. Understanding the causal relationship between interventions targeting provider feeding styles and child nutrition outcomes is crucial. The questionnaire evaluates caregiver accuracy in feeding styles, encompassing basic feeding rules [51], [52].

4. CONCLUSION

Children who are well-fed during the complementary feeding period (6-24 months) are likely to grow into individuals with optimal growth and development. Basic feeding rules encompass structured guidelines involving three aspects: schedule, environment, and feeding procedures. By adhering to basic feeding rules, a child's growth rate can be enhanced, and the risk of failure to thrive reduced. Feeding rules are closely tied to responsive feeding. These basic complementary feeding guidelines are categorized based on the feeding schedule, feeding procedures, and feeding environment. Therefore, it is crucial for healthcare professionals to provide counseling on the fundamental principles of complementary feeding.

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