

Behavioral Factors Related to Child Feeding Disorders: A Narrative Review

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Abstract- Elevated prevalence of stunting due to poor diet could have a long-term negative health impact. Children with feeding disorders (CFDs) are identified when they consistently fail to fulfill their nutrient demands, which is linked to a lack of weight gain or slowed growth. This was a narrative review study. Several electronic databases were used for article searching. Several keywords used for literature searching including “child feeding disorders”; “factor related to CFD”; “child feeding disorder predictor”. Inclusion criteria used was the subject of intervention should be an aged 6month-6-year-old; cross-sectional study, research published before 2000, literature studies, meta-analysis, comments, short communication, and editorial letters are exclusion criteria of this study. Predictor of FD related to behavior are - maternal worries about child weight and underrating, high level of mother-child and father-child conflict, negative eating control, father’s involvement in feeding, mealtime disorganizations, mothers with depression and anxiety symptoms, the use of food to regulate behavior, and a lack of encouragement. CFDs highly related to parental feeding regulation and psychological issue, especially among mothers.

Index Terms- behavior, child feeding disorders, malnutrition, stunting, maternal

I. INTRODUCTION

Stunting as the form of chronic malnutrition has become global concern due to its long-term consequences such as elevating risk of non-communicable diseases, decreased intelligence quotients (IQ) and cognitive development, decreased productivity and loss of job opportunities that lead to economic burden [1]. Stunting defined as the impaired growth and development due to repeated infection, poor nutrient intake, and inadequate psychosocial stimulation. Moreover, stunting measured by Height-for-Age Z-score (HAZ) that is than -2 SD below the WHO Child Growth Standards median [2]. Increased international attention is the result of greater awareness of the significance of stunting as a major public health problem. Currently, stunting remains as national priority in Indonesia because 3 out of 10 children in Indonesia are stunted [3]. The World Health Assembly set a goal of halving the number of stunted children under the age of five by 2025 [4].

The golden period of child development where nutritional adequacy is crucial is at the first 1000 days of life that count from conception period to 2 years old children [5]. Therefore, child-feeding practice starting from infant to 2 years should be maintained carefully. Many factors contribute to the existence of stunting. The determinants of maternal and child nutrition by the UNICEF explains that cause of malnutrition is poor diet and poor care were declared by the UNICEF Nutrition Strategy 2020–2030. Poor diets including less energy and protein intake as well as micronutrient while poor care related to parent’s ability to taking care and applying health practices for the child [6]. Twenty-five percent of children are reported to present with some form of feeding disorder which could lead to poor diets and development [7].

During the past decades, relationship between health and diet related behavior and cognitive predictor had been observed [8]. It implies that nutritional status of children could be defined by parents or care providers behavior toward nutritious feeding. A relationship between maternal behavior, infant behavior and infant nutritional status has long been observed, in 1976 in India have found that mothers of

undernourished infant having lower scores of maternal behavior measures compared to well-nourished infant [9]. Feeding difficulties and disorders is one of the factors that highly correlate with poor diet. Children with feeding disorders (FDs) are identified when they consistently fail to fulfill their nutritional demands, which is linked to failure to gain weight [10]. A study in Jakarta, Indonesia found that 30% of feeding difficulties caused by inappropriate feeding practice [11]. Limited review is done to analyze the factors related with FDs among children, whereas, this information is crucial to understand the case factors and develop a proper intervention of FDs to prevent child malnutrition.

II. MATERIALS AND MENTHODS

Five electronic databases were used for article searching (i.e., Google scholar, Semantic-scholar, Science-direct, PubMed, and PMC). An online search was conducted in June 2021 for all articles related to factor affecting child feeding disorders. Several keywords used for literature searching including “child feeding disorders” OR “factor related to CFD” OR “child feeding and malnutrition”.

This narrative review aims to answer research questions “what is the factor related with child feeding disorders?”. The sample in this literature study was mothers with children ages 6 month – 2 years old who participated in experimental or non-experimental research that measured the factor associated with child feeding disorders among under-two children. We include the paper that use intervention subject aged 6 months – 2 years old with experimental randomized control trial (RCT) or non-RCT study design. Meanwhile, study sample of children with disabilities, aged >6 years, research published before 2000, literature studies, meta-analysis, comments, short communication, and editorial letters were exclusion criteria. Two reviewers evaluated papers for inclusion as well as research quality and data extraction. Only research that have been published in English were considered. The information was presented in a narrative format.

The scope of this narrative review is in line with the aim that is to describe the factor related with child feeding disorders and understand some intervention that might be useful to reduce the risk of child feeding disorders especially in under two age group. The literature used in this review critically appraised by two reviewers independently using the Oxford Center for Evidence-Based Medicine Critical Appraisal Tool. Risk of bias were assessed using the Cochrane Risk of Bias Tool which then classified into low bias risk, high bias risk, unclear bias risk, and no information on bias risk by two independent reviewers. Visualization using Robvis (Risk-of-Bias VISualization) based on R package by filling Quality in Prognosis Studies Tool (QUIPS) and generate the graph after uploading the metadata.

III. RESULTS

This narrative review aims to describe some of the factors associated with Child Feeding Disorders (CFDs). We assume that a study longer than 2000 might be not suitable with recent conditions, thus we included only study from 2000 to present. Seven papers were assessed for its contents and narratively described. Table 1 summarize the finding of the factors related to CFDs.

An interesting finding from Gueron-Sela, et al. study that explain maternal worries about child undereating, maternal worries about underweight both lead to CFDs as well as mother-child relationship issue [12]. Moreover, negative mother-child interaction among CFDs group also increase maternal worry regarding child underweight. Aviram, et al [13] reported that child with FD experience conflict with parents and hard control during mealtime ($p < 0.01$); in addition, negative mealtime dynamics negatively correlate with mothers feeling about their competency. Apart from mother's role, Atzaba-Poria, et al. [14] study also look for father's role which found that lower levels of sensitivity was seen among fathers with child-feeding problems [$t(51) = 2.61$ ($p < 0.05$)]. Gueron-Sela, et al.; Aviram, et al.; and Atzaba-Poria, et al. study have similarities in terms of mean age of children with FD that is around 20-21 months old [12–14].

Cooper, et al. research hypotheses that FD might be mediated by maternal eating disorders [15]. Through path analysis, the hypotheses were proved those relationship and further explained that relationship between maternal eating disorders and CFD are mediated with family environment including

mealtime disorganization and strong maternal control. Similar to Cooper study, Blissett, et al., also found that maternal mental health was correlated with FD, but different maternal psychopathology affects differently in boys and girls. In boys, mother's anxiety was more related while in girls, mother's self-reported bulimia and depressive that more correlate to food refusal [16]. Child feeding problems were also positively associated with food neophobia and external behavioral and social issues as reported by Aldridge, et al. [17]; each predictor variable will be explained in discussion part. Newest publication in 2021 reported that child food avoidance eating habits reports from mothers were linked to an emotional child temperament, high levels of parental feeding control, the use of food to regulate behavior, and a lack of encouragement for a well-balanced and diverse diet [18]. Food avoidance was one type of food disorders that might occurs among children.

Table 1 Summary of factors related to CFDs

Reference	Study design	Sample	Results
Gueron-Sela, et al. [12]	Cross-sectional	Between the ages of one and three years, 27 children with FD and 28 children without FD were studied	Mean age FD child: 21 months (1.94y) Significant correlations were discovered: - child FD and maternal worries about child undereating ($r=0.76$, $p<.001$) - child FD and maternal worries about child underweight ($r=0.56$, $p<.001$) - child feeding and mother-child interaction ($p<0.05$)
Aviram, et al. [13]	Cross-sectional	97 1–3-year-old children	Mean age FD child: 20 months (1.8y) Conflict between children and both parents, also hard control during mealtime were experienced by the children with FD ($p<0.01$); also, negative mealtime dynamics negatively correlate with mothers feeling about their competency.
Atzaba-Poria, et al. [14]	Cross-sectional	67 1–3 years old children	Mean age FD child: 21 months (1.97y) The FD group's fathers had lower levels of sensitivity., $t(51) = 2.61$ ($p < 0.05$).
Cooper, et al. [15]	Cross-sectional	116 family with pre-school children	Mean age of the children with FD: 55.4 months Factors that strongly related to CFD are mealtime disorganisation, strong maternal control and disharmony.
Blissett, et al. [16]	Cross-sectional	56 male children's mothers and 40 female children's mother	In male children's mothers, depression and anxiety symptoms, but not eating disorders, were predictors of poor feeding relations. Bulimia and depressive symptoms, but not anxiety, were significant predictors of female child mothers' reported food refusal.
Aldridge, et al. [17]	Cross-sectional	Mothers of children aged 3 to 6 years	Food neophobia, as well as external behavioral and social difficulties, were found to be positively linked with child feeding problems.
Powell, et al. [18]	Cross-sectional	104 mother-child pair (age 3-6 years)	Child food avoidance eating habits reports from mothers were linked to an emotional child temperament, high levels of parental feeding control, the use of food to regulate behavior, and a lack of encouragement for a well-balanced and diverse diet.

Study	Risk of bias domains						Overall
	D1	D2	D3	D4	D5	D6	
Gueran-Sela (2011)	-	+	-	+	-	+	-
Aviram (2014)	-	+	+	-	+	-	-
Atzaba-Poria (2010)	-	+	+	+	-	+	+
Cooper (2004)	+	+	-	+	+	+	+
Blisset (2007)	+	-	+	-	+	+	+
Aldridge (2015)	+	+	+	+	+	+	+
Powell (2011)	+	-	-	+	✗	+	-

Domains:
 D1: Bias due to participation.
 D2: Bias due to attrition.
 D3: Bias due to prognostic factor measurement.
 D4: Bias due to outcome measurement.
 D5: Bias due to confounding.
 D6: Bias in statistical analysis and reporting.

Judgement
 ✗ High
 - Moderate
 + Low

Figure 1 Table of Risk of Bias from Reviewers Judgement for Each Included Literature Study Used Robvis

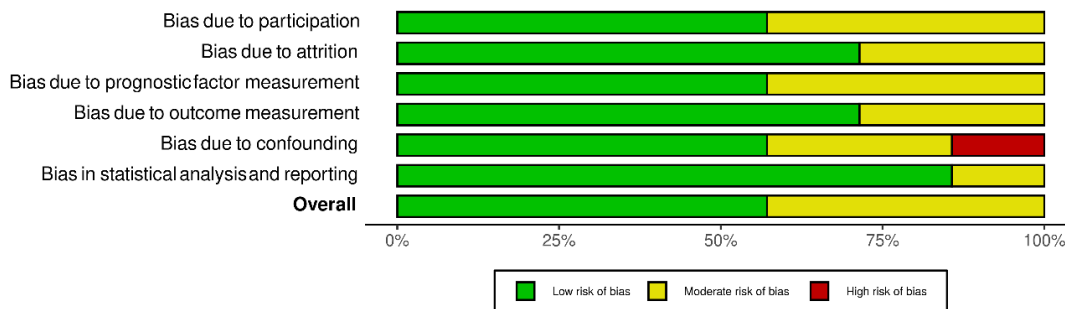


Figure 2 Risk of Bias Graph from Reviewers Judgement for Each Included Literature Study Used Robvis

IV. DISCUSSIONS

American Psychiatric Association through The Diagnostic and Statistical Manual of Mental Disorders (DSM IV) defined child feeding disorders (FD) as evidence of any other general medical conditions or mental disorders that may account for the feeding problem and onset before the age of 6 years, persistent failure to eat adequately with significant failure to gain weight or significant loss of weight over at least one month, without evidence of any other general medical conditions or mental disorders that may account for the feeding problem. [19].

In 2019, a consensus to define Child Feeding Disorders (CFDs) characterized as a lack of age-appropriate oral intake that is linked to medical, nutritional, feeding skill, and/or psychosocial problems [20]. The inability to consume enough food and drinks to fulfil nutritional needs is referred to as impaired oral intake. CFDs classified in to acute and chronic depending on the duration of difficulty eating. If its <3 months then classify as acute and chronic if >3 months. To be more specific, each criteria of feeding disorders is presented in the table 2 below:

Table 2 Criteria of feeding disorders

Characteristic	Description*
Medical dysfunction	a. During oral feeding, cardiorespiratory impairment occurs b. Pneumonitis caused by aspiration or repeated aspiration
Nutritional dysfunction	a. Malnutrition b. Low dietary diversity causing restricted nutrient intake or nutrient deficiency
Motor skill dysfunction	Limitation in eating activity a. Need for liquid/food texture modification b. Feeding position or equipment modification c. Feeding strategies modification
Psychosocial dysfunction	Limitation in activities associated with interpersonal interaction

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- a. Children showed active/passive avoidance during feeding
 - b. Inappropriate caregiver management of the child's feeding and/or nutrition requirements
 - c. Social functioning disturbance related with feeding
 - d. Caregiver-child relationship disturbance related with feeding
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*) CFDs defines if 1 or more characteristic lasting for >2 weeks

Based on the results of narrative review, we narratively explain factors that contributed to FD. Mothers' who are worry about child undereating and child weight could lead to feeding difficulties. Between those relationship, maternal worriers increased intrusiveness and mother's behavior toward feeding practice will be less structured [21]. This result strengthens with another study that successfully proved that maternal concern about weight was related to CFDs. If the FD appears and elevated worriedness combined, then it could result in negative feeding interaction between mother and child. In turns, FD could be even worsened. The authors mentioned that to tackle this cause of FD, an effort to help mothers overcoming their worries and releasing emotional burden about either undereating or child weight should be done [12]. Another study interestingly explained mother's emotional as one the factors related to FD. Among FD children, mothers are more stressful and tend to have negative perceived about her competence as a mother [22]. They also tend to self-blame, struggle to control during mealtimes, being more harsh to the child then resulting in prolonged FD [13, 23].

Maternal sensitivity or described as the capacity to notice, analyze, and respond to a child's signals in a timely and appropriate manner [24] were also related to FD. Not only mother's role, another study strengthen the father's role in FD children as revealed in Atzaba-Poria, et al [14] that low paternal involvement might also lead to FD due to less positive child-parent interaction during mealtime. This emphasizes the need of responsive feeding implementation during feeding time. World Health Organization (WHO) explained responsive feeding as one of principle of complementary feeding that should be followed to achieve good feeding behavior [25].

Mealtime disorganization and strong maternal control are another two factors related to FD. Mealtime disorganization were factors including feeding location (dining room or kitchen), feeding disposition (chair and table), presence of mother/eating together, distraction during eating (playing or watching TV), and child eating with sibling. Study of Blissett [16] explained that different predictor of FD between boys and girls are depend on maternal condition and background. In boys, feeding issues are frequently linked to worries about optimizing healthy eating and intake, as well as behavioral tactics that may include overprovisioning of meals and persuading to eat. Feeding female children, on the other hand, is frequently focused with regulating and reducing bad eating and preventing the development of obesity, particularly in moms with unhealthy eating habits.

Food neophobia, which refers to a reluctance to consume or the avoidance of novel foods, was also positively related with child feeding difficulties [26]. Furthermore, external behavioral and social concerns are defined in terms of externalizing symptoms, but parental views of problems and coping are linked to social-interaction problems in children, which can lead to child feeding disorders. Food avoidance as one type of CFDs also reported to be predisposed by child emotional, parenting feeding control and regulating behavior through food. Strategies that used most of parents to increase child's intake on the contrary increase risk of FD because it facilitates negative mealtime for both parent-child [27] and increase child emotional. In returns, child behave to avoid specific foods as characterized by slowness in eating, emotional under-eating, and satiety responsiveness [18].

V. CONCLUSION

Most of factors that contribute to FD are highly correlated to maternal behavior and family environment. This review could a beneficial information to develop a further study regarding feeding difficulties and strategy to prevent and/or overcome FD among children.

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