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Practice of Responsive Feeding and Its Correlation with Stunted Children and Obese/Overweight Mothers (SCOM) in Semarang City

Praktik Responsive Feeding dan Hubungannya dengan Stunted Children and Obese/Overweight Mothers (SCOM) di Kota Semarang

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ABSTRACT

Background: A double burden of malnutrition can occur at individual, household, or community levels.
Objectives: This study analyzed the relationship between responsive feeding practices and Stunted Children and Obese/Overweight Mothers (SCOM) as a type of double-burden malnutrition at the household level.
Methods: An observational analytical study with a case-control design was conducted in Semarang City between May and October 2022. The subjects of this study were mother-toddler pairs (children < 3 years old) with SCOM and non-SCOM conditions in Semarang. Inclusion criteria were as follows: mothers and toddlers in good health (mothers do not have diseases that require special diets, and toddlers are in good health at the time of the study) and the mother did not smoke or drink alcohol. Ratio SCOM: non-SCOM groups was 1:2. Maternal nutritional status was measured using the Body Mass Index (BMI). Stunting classification (PB/U or TB/U) used the WHO Anthro software version 1.03. Data analysis was performed using chi-square, Pearson correlation, and multiple logistic regression.
Results: Poor responsive feeding practices occurred in 95.8% of the SCOM families. There was a correlation between the parents' educational level and the practice of responsive feeding. There was a correlation between responsive feeding attitudes and practices and SCOM. After controlling for sociodemographic characteristics, responsive feeding practice predicted SCOM with an Odd Ratio (OR) of 0.012 (0.001–0.191). Responsive feeding practices were correlated with the prevalence of SCOM.
Conclusions: Most families with SCOM practice responsive feeding in poor categories. Responsive feeding practices were a predictor of SCOM.

INTRODUCTION

Obesity is a widespread public health problem worldwide[1]. Obesity threatens both developed and developing countries. World Health Organization (WHO) data show that as many as 1.9 billion adults worldwide were overweight in 2016[2]. Overweight occurs in 39% of the world's adult population, and obesity occurs in 13% of the world's adult population[3]. Increased obesity trends also occur in Indonesia, as contained in the Basic Health Research Results (Riskesdas), where the prevalence of overweight and obesity in adults in 2018 was 35.4%. The prevalence was higher in women (29.3%) than men (14.5%)[4,5].

Besides obesity, it is known that undernutrition is also a global problem[6]. Based on United Nations International Children's Emergency Fund (UNICEF) data, there are currently 144 million children under five who are stunted. Stunting can decrease brain development and cognitive potential that cannot be optimally developed[7]. In Indonesia, the Study on Nutritional Status of Toddlers in Indonesia (SSGBI) data shows that the prevalence of stunting under five in Indonesia in 2021 is 24.7%[8]. Based on Nutritional Status Survey Indonesia (SSGI) data from 2022, the prevalence of stunting in toddlers was 21.6%[9]. Although there is a decreasing trend in the prevalence of stunting in Indonesia, this figure is still higher than the 2024 National Medium-Term Development Plan (RPJMN) target of 14%[8].

The prevalence of chronic excess and malnutrition, both high in an area and have a broad impact, is known as the double burden of nutritional problems[10,11]. The double burden of nutritional problems can impact infectious diseases, non-communicable diseases, and mortality. The double burden of nutritional problems can also harm decreasing productivity as adults and pregnancy[12].

A double burden of nutritional problems can occur at the individual level[13], household level[14–16], and

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community level[17,18] throughout the life cycle[19,20]. The double burden of nutritional problems at the household level, in the form of stunting in children under five and overweight/obese mothers, is known as SCOM (Stunted Children and Obese/Overweight Mothers)[12]. Research in Myanmar in 2021 showed that 32.7% of the mothers of stunted children were overweight[21]. Research in Mexico in 2021 states that more than half of children with stunting have mothers who are overweight or obese (53.3%)[22].

The double burden of nutritional problems occurs due to the impact of urbanization, which has led to the development of a modern lifestyle, supported by increasing social and economic conditions of the community and impacting the nutritional transition and changes in lifestyle[23]. Factors related to children's malnutrition and excess nutrition in mothers are related to health behavioural factors (food intake and physical activity) and biological factors (disease status and genetics). This incident is also related to environmental factors, namely the food environment (food security and access), the social environment (parenting patterns of feeding), the health environment (access to health services, prevention and treatment), and the living environment (water and sanitation hygiene)[12]. Stunting in children in SCOM families is also associated with factors such as the number of children, the mother's employment status, household income, parents' education, and nutrient intake[19,24,25].

Parenting patterns of feeding have been widely reported to be associated with the nutritional status of children under five 19 and double burden of malnutrition[12]. Poor feeding patterns, including low-energy feeding, irregular feeding, inadequate feeding during and after illness, inadequate intake in quantity, and non-responsive feeding[26], can significantly cause stunting[27,28]. Research in Ethiopia in 2017 reported that mothers who practice non-responsive feeding, namely forcing their children to eat, have a risk of reducing the frequency of eating in children[29,30].

Responsive feeding practices involve both active and responsive feeding. This practice can promote healthy eating habits and growth in children. Caregivers who apply responsive feeding can recognize signs of hunger and satiety in children and can regulate and control themselves regarding food intake to reduce malnutrition in children[30]. Poor responsive feeding practices among 0-59 month-old children can increase the risk of stunting 6,496 more than good responsive feeding practices[31].

The study analyzes knowledge, attitudes, and responsive feeding practices and their correlation with SCOM in Semarang City. It is based on the opinion that SCOM has become a threat in Indonesia, especially in large cities such as Semarang, but studies about SCOM still need to be conducted. Likewise, many studies have been carried out regarding feeding practices, but research on responsive feeding practices still needs to be conducted. Apart from that, no research in Indonesia has examined the relationship between responsive feeding practices and the incidence of SCOM.

METHODS

Design and Research Ethic Permit

The research was conducted with a case-control analytical observational design. The research was conducted in Semarang City from May to October 2022. This research has received permission from the Health Research Ethics Committee, Faculty of Medicine, Diponegoro University Number 106/EC/KEPK/FK-UNDIP/IV/2022.

Data Source

This study used primary data sources from structured interview methods using questionnaires and direct measurements. The method used was a structured interview using a questionnaire and anthropometric measurements of mothers and children aged < 3 Years (toddlers).

Research Subject

The subjects of this study were mother-toddler pairs (age < 3 years) with SCOM and non-SCOM conditions in Semarang City. Subjects with SCOM were selected by stratified screening based on the area of residence with a high prevalence of stunting in 2022 and the mother's nutritional status of stunting children. The non-SCOM group, namely pairs of mothers and toddlers without SCOM conditions (without stunting in children, without overweight/obese conditions in mothers, or a combination of the two conditions), was matched for age and sex with the SCOM group.

The inclusion criteria were mothers and toddlers (children aged < 3 years), mothers and toddlers in good health (mothers do not have diseases that require special diets, children were in good health at the time of the study), and mothers who did not smoke or drink alcoholic-beverages. The participant signed informed consent to participate in the research until the end. The exclusion criteria in this study were toddlers with a history of premature birth, single-parent mothers, toddlers not living with their parents, pregnant mothers, and mothers with malnutrition status based on BMI indicators. The ratio between the SCOM and non-SCOM groups was 1:2. The subjects in this study included 72 samples with 24 SCOM subjects (stunting toddlers with height/age (HAZ) or length/age (LAZ) <-2 SD and overweight/obese mothers with BMI >23 kg/m2) and 48 non-SCOM subjects.

Research Variable, Instrument Development, and Data Collection Techniques

The research variables studied were knowledge, attitudes and practices of responsive feeding, the incidence of SCOM (SCOM/non-SCOM) and the characteristics of the subject and the toddler's family, including the characteristics of the mother (occupation, education, income and age of the mother), the characteristics of the father (employment, education, income, and father's age), and child characteristics (gender, exclusive breast milk (ASI), number of children, and age of children). A structured questionnaire was used to collect data on the characteristics of subjects and families of toddlers, knowledge, attitude and responsive feeding practices (referring to WHO). The variables of knowledge, attitudes and responsive feeding practices

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are displayed in categories with the median value as the cut-off point for the excellent and poor categories[32]. The variables of knowledge, attitudes and responsive feeding practices were measured using a questionnaire whose validity and reliability were tested. The knowledge, attitude and responsive feeding practice questionnaire have met the validity requirements ($p<0.05$ with correlation test) and reliability (Cronbach's Alpha= 0.677; 0.699; and 0.778).

Anthropometric measurement for mothers includes weight, height, and BMI. The nutritional status is measured by BMI indicator with the BMI cut-off point referring to adult BMI for the Asia Pacific region, namely normal nutritional status (18.5–23.49 kg/m2), overweight (23.5–24.99 kg/m2), and obese (≥25 kg/m2)[33,34]. Anthropometric measurements for toddlers included HAZ (for ages >2 years) or LAZ (for ages ≤2 years). Stunting classification (HAZ or LAZ) uses WHO Anthro software version 1.03[35].

Data Analysis Technique

Descriptive data analysis was conducted to identify the characteristics of the subjects and families of toddlers in the form of proportions or means ± standard deviation. The relationship between sociodemographic characteristics, responsive feeding, and SCOM practices was analyzed using the chi-square test (categorical data) and Pearson's correlation (numerical data, normal distribution). The relationship between knowledge, attitudes, and responsive feeding practices and SCOM was analyzed using the chi-square test. SCOM predictor variables were analyzed using multivariate tests, namely, multiple logistic regression.

RESULTS AND DISCUSSION

Sociodemographic Characteristics

Tables 1 and 2 show that the sociodemographic characteristics associated with SCOM were the father's education level (p=0.002) and the mother's education level (p=0.020). Fathers with higher educational levels were more common in the non-SCOM group (27.1%) than in the SCOM group (4.2%). Mothers with higher education levels were only found in the non-SCOM group (25 %). In addition, there were more mothers with primary education in the SCOM group than in the non-SCOM group (12.5% and 6.3%).

Table 1. Children's characteristics between SCOM and non-SCOM group

Children Characteristic	Group				p-value	cOR	95% CI	
	Non SCOM		SCOM				Lower	Upper
	n	%	n	%				
Gender								
Boy	25	52.10%	11	45.80%	0.803	1.285	0.481	3.431
Girl	23	47.90%	13	54.20%				
Exclusive breastfeeding								
No	11	22.90%	2	8.30%	0.233	3.27	0.663	16.139
Yes	37	77.10%	22	91.70%				
Several children								
≤ 2 children	34	70.80%	12	50.00%	0.073	0.412	0.149	1.135
> 2 children	14	29.20%	12	50.00%				
Age	23.67	8.198	23.33	8.323	0.872			

SCOM: Stunted Children and Obese/Overweight Mothers; cOR: crude Odd Ratio; CI: Confidence Interval

Table 2. Parent sociodemographic characteristics between SCOM and non-SCOM group

Parent Characteristic	Group				p-value
	Non SCOM		SCOM		
	n	%	n	%	
Father's Characteristic					
Profession					
Government employee	1	2.10%	1	4.20%	0.556
Private sector employee	23	47.90%	9	37.50%	
Laborer	8	16.70%	8	33.30%	
Self-employed	11	22.90%	4	16.70%	
Other	5	10.40%	2	8.30%	
Level of education					
Not completed in primary school	0	0.00%	1	4.20%	0.002
Primary school	4	8.30%	10	41.70%	
Junior high school	7	14.60%	1	4.20%	
Senior high school	24	50.00%	11	45.80%	
D1/D3/S1/higher	13	27.10%	1	4.20%	
Monthly income					
0	2	4.20%	0	0.00%	0.42
< Rp 2,835,021.29	22	45.80%	14	58.30%	
≥ Rp 2,835,021.29	24	50.00%	10	41.70%	
Age (mean (SD))	34,02	6.657	36	8.983	0.295

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Parent Characteristic	Group				p-value
	Non SCOM		SCOM		
	n	%	n	%	
Mother's Characteristic					
Profession					
Private sector employee	9	18.80%	4	16.70%	0.816
Labourer	2	4.20%	1	4.20%	
Self-employed	6	12.50%	2	8.30%	
Housewife	29	60.40%	17	70.80%	
Other	2	4.20%	0	0.00%	
Level of education					
Not completed in primary school	3	6.30%	3	12.50%	0.020
Primary school	8	16.70%	7	29.20%	
Junior high school	25	52.10%	14	58.30%	
Senior high school	12	25.00%	0	0.00%	
Monthly income	28	58.30%	17	70.80%	0.180
0	10	20.80%	6	25.00%	
< Rp 2,835,021.29	10	20.80%	1	4.20%	
≥ Rp 2,835,021.29					
Age (mean (SD))	31.38	6.648	32.63	7.418	0.472

SCOM: Stunted Children and Obese/Overweight Mothers; cOR: crude Odd Ratio; CI: Confidence Interval

Relationship between sociodemographic characteristics and responsive feeding

Table 3 shows a relationship between parent's educational levels and responsive feeding practices (p<0.001 and p=0.046, respectively). Responsive feeding practices in the excellent category (32.4%) in families with a high level of father's education (Diploma/Bachelor/more) were found more often than poor responsive feeding practices (5.7%). Likewise, good, responsive feeding practices (27.0%) were found in families with high levels of mothers' education (Diploma/Bachelor/more) compared to those with poor responsive feeding practices (5.7%). No relationship was found between other sociodemographic characteristics and responsive feeding practices.

Table 3. Responsive feeding practices based on sociodemographic characteristics

Sociodemographic Characteristic	Category Of Responsive Feeding Practices				p-value	cOR	95% CI	
	Poor (Practices Score<Median)		Good (Practices Score≥Median)				Lower	Upper
	n	%	n	%				
Children								
≤2 children	21	60.00%	25	67.60%	0.542	1.389	0.529	3.645
> 2 children	14	40.00%	12	32.40%				
Father's profession								
Government employee	1	2.90%	1	2.70%	0.586			
Private sector employee	16	45.70%	16	43.20%				
Laborer	10	28.60%	6	16.20%				
Self-employed	6	17.10%	9	24.30%				
Other	2	5.70%	5	13.50%				
Father's level of education								
Not completed in primary school	1	2.90%	0	0.00%	<0.001			
Primary school	12	34.30%	2	5.40%				
Junior high school	1	2.90%	7	18.90%				
Senior high school	19	54.30%	16	43.20%				
D1/D3/S1/higher	2	5.70%	12	32.40%				
Father's monthly income								
0	1	2.90%	1	270%	0.709			
< Rp 2,835,021.29	19	54.30%	17	45.90%				
≥ Rp 2,835,021.29	15	42.90%	19	51.40%				
Mother's profession								
Private sector employee	5	14.30%	8	21.60%	0.914			
Laborer	2	5.70%	1	2.70%				
Self-employed	4	11.40%	4	10.80%				
Housewife	23	65.70%	23	62.20%				

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Sociodemographic Characteristic	Category Of Responsive Feeding Practices				p-value	cOR	95% CI	
	Poor (Practices Score<Median)		Good (Practices Score≥Median)				Lower	Upper
	n	%	n	%				
Other	1	2.90%	1	2.70%				
Mother's level of education								
Primary school	4	11.40%	2	5.40%	0.046			
Junior high school	8	22.90%	7	18.90%				
Senior high school	21	60.00%	18	48.60%				
D1/D3/S1/higher	2	5.70%	9	27.00%				
Mother's monthly income								
0	23	65.70%	22	59.50%	0.288			
< Rp 2,835,021.29	9	25.70%	7	18.90%				
≥Rp 2,835,021.29	3	8.60%	8	21.60%				

SCOM: Stunted Children and Obese/Overweight Mothers; cOR: crude Odd Ratio; CI: Confidence Interval

This study revealed that the practice of responsive feeding is related to the educational level of the parents of toddlers. This aligns with previous research, which reported that poor feeding practices are associated with low maternal education[19]. Parental education was also related to SCOM, although the relationship was not statistically significant using multivariate analysis. Education level is one of the factors that can affect the quality and quantity of food[36]. People with low education will find it easier to accept new information and change family traditions, including eating habits[37]. This can affect the nutritional status of family members.

This study also revealed that Education was related to nutritional knowledge and employment status. A father with a higher education can have better nutritional knowledge to understand health and food problems and solutions in the family environment[38]. Likewise, a mother's education can affect the level of mother's knowledge[39]. Mother's education was significantly related to the incidence of stunting. Mothers' education level is related to their understanding in terms of food choices and childcare skills. The mother's understanding will be better if the mother has a higher education[25].

Parents, especially mothers, also have a role in the household as decision-makers regarding purchasing family food[40]. The level of education is related to knowledge about sources of nutrition and types of family consumption. Mothers' knowledge related to their practices in fulfilling family nutrition. The better the mother's knowledge in terms of nutrition, the better their practice in fulfilling balanced nutrition[37]. Another study also explains that mothers who are more educated will have better feeding practices, namely providing food 2-4 times per day, with at least one animal side dish and one fruit or vegetable a day[41].

A study in Ethiopia (2017) reported that stunted children who were given non-responsive feeding practices in the form of forcing them to eat had a risk of reducing the frequency of eating by 4.2 times compared to mothers who did not force their children[29,30]. In line with these findings, non-responsive feeding significantly increases the risk of stunting in toddlers by 6.5 times[31].

Relationship Between Responsive Feeding and SCOM

As shown in Table 4, responsive feeding practices in full, responsive feeding attitudes, responsive feeding practices, and KAP-responsive feeding were associated with SCOM (p=0.032, p=0.030, p<0.001, and p<0.001, respectively). There was no significant relationship between responsive feeding knowledge and SCOM (p=0.404). Complete responsive feeding practices, including the five indicators, were applied by 16.7% of the non-SCOM group subjects. Responsive feeding attitudes in the excellent category were more common in the non-SCOM group (60.4%) than in the SCOM group (33.3%). Likewise, the practice of responsive feeding in the excellent category was mainly carried out by the non-SCOM group (75%) compared to the SCOM group (4.2%).

Table 4. Relationship of knowledge, attitudes, and practices of responsive feeding with scom

Responsive Feeding	Group				p-value	cOR	95% CI	
	Non SCOM		SCOM				Lower	Upper
	n	%	n	%				
All responsive feeding practices								
Not complete	40	83.30%	24	100.00%	0.032			
Complete	8	16.70%	0	0.00%				
Responsive feeding knowledge								
Poor	21	43.80%	13	54.20%	0.404	1.519	0.568	4.068
Good	27	56.30%	11	45.80%				
Responsive feeding attitude								
Poor	19	39.60%	16	66.70%	0.03	0.328	0.117	0.915
Good	29	60.40%	8	33.30%				
Responsive feeding practices								
Poor	12	25.00%	23	95.80%	<0.001	0.014	0.002	0.119

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Responsive Feeding	Group				p-value	cOR	95% CI	
	Non SCOM		SCOM				Lower	Upper
	n	%	n	%				
Good	36	75.00%	1	4.20%				

SCOM: Stunted Children and Obese/Overweight Mothers; cOR: crude Odd Ratio; CI: Confidence Interval

Table 5. SCOM predictor models

Variable	B	p-value	aOR	95% CI	
				Lower	Upper
Father's level of education	-0.540	0.176	0.583	0.266	1.275
Mother's level of education	-0.610	0.288	0.543	0.176	1.676
Responsive feeding attitude	-0.974	0.258	0.378	0.070	2.039
Responsive feeding practices	-4.403	0.002	0.012	0.001	0.191
Mother's monthly income	-0.774	0.191	0.461	0.145	1.470
Constant	8.920	0.001	7481.726		

SCOM: Stunted Children and Obese/Overweight Mother; aOR: adjusted Odd Ratio; CI: Confidence Interval

Table 5 shows that responsive feeding was a predictor of SCOM. The OR value was 0.012 (0.001-0.191), which means that responsive feeding practices are a protective factor for SCOM. Families that practice responsive feeding are 83 times more protected from SCOM (0.012: 1) than those that do not.

Based on the results of this study, responsive feeding is a predictor of SCOM. Families who practice responsive feeding have a lower risk of developing SCOM than those who do not.

Responsive feeding practices include active and responsive feeding, including age-appropriate feeding, encouraging children to eat, communicating about food, exemplifying eating habits, responding to children's appetite, and feeding in a safe environment. Caregivers who apply responsive feeding will encourage healthy eating and growth habits, recognize their hunger and satiety cues, and regulate and control themselves regarding food intake, which can further reduce malnutrition in children[30].

Previous research in 2016 in the city of Semarang showed that there were inappropriate responsive feeding practices for stunted children aged 6-36 years in the city of Semarang[42]. Based on the results of this study, the practice of responsive feeding in the excellent category was mainly executed by the non-SCOM group (75%) compared to the SCOM group (4.2%). Complete responsive feeding practice included five indicators applied by 16.7% of the non-SCOM group subjects. No non-SCOM group had fully practiced responsive feeding practice indicators. The five indicators of responsive feeding in this study are providing age-appropriate food (feeding directly/helping children eat themselves), feeding slowly, patiently, and encouraging children to eat, knowing positive strategies for responding to refusal to eat, providing food in a safe environment, and use mealtime as a time to learn and love one another[43].

Much evidence showed the link between feeding and stunting in toddlers[31,42,44]. A study by Latifah in 2020 showed a relationship between responsive feeding practices and the incidence of stunting in toddlers aged 6-36 months in Tegal City[45]. Poor responsive feeding practices can increase the risk of stunting 6,496 times compared to good responsive feeding practices in toddlers 0-59 months[31]. However, there is no strong evidence regarding the feeding of overweight/obese mothers with stunted children (SCOM), as in this study.

Nutritional and epidemiological transitions have supported the development of unhealthy lifestyles and eating patterns that support the development of SCOM. The nutritional transition shows a change in eating patterns towards the Western diet, characterized by high-calorie, high-saturated fat, high-sugar, and low-fiber diets. For adults, a high-energy diet can lead to micronutrient deficiencies and an increased risk of obesity[46]. For children, high-energy and low-quality foods do not provide optimal nutrition to grow appropriately[14]. In other words, high-energy foods can only increase the incidence of obesity in mothers and increase the risk of stunting in children[47].

Based on the principle of responsive feeding, parents and/or family members are encouraged to teach them to prefer eating healthy foods and serving healthy, tasty and appropriate food according to the child's age. Responsive feeding strategy recommends that caregivers not force-feed and threaten children[30,42]. Non-responsive feeding in the form of authoritarian/coercion and neglect has been reported to cause refusal to eat in children and cause stunting due to decreased intake feeding the child[30,48,49]. However, this is often difficult for the caregivers. Caregivers are forced to force the child to eat because the child refuses to eat or instead gives any food as long as the child wants to eat. This coercion/authoritarian (pressuring and controlling/restricting type) is included in the practice of non-responsive feeding in addition to permissive (indulgence type) and neglect (uninvolved type)[30].

As with coercion, feeding with a permissive system gives children a whole will regarding eating. This practice can cause stunting in children because of the lack of parental/caregiver roles in feeding children. Parents/caregivers only reprimand/remind if the child eats so that the child's intake is sufficient in quantity and quality[27,28,30].

WHO recommendations regarding responsive feeding practices encourage parents or caregivers to feed their children when they are 6-8 months old. After the age of 8 months (> eight months), children are encouraged to feed themselves more often with the help of parents or caregivers[50]. However, caregivers often

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feed children aged > 8 months or even allow children aged < 8 months to eat alone because a child refuses to eat. The practice of responsive feeding or non-responsive feeding applied by the mother can occur due to the perception of the mother or caregiver (hereditary), as in Bangladesh, caregivers believe that children aged 2-3 years cannot eat alone[30]. mother living in a family and unsupportive environment, such as lack of exposure to information from health workers or services, or the influence of parents (grandparents) can also cause the mother to engage in poor feeding practices such as low-energy feeding, low-energy feeding, irregular, inadequate feeding during and after illness, inadequate intake in quantity, and non-responsive feeding[26].

CONCLUSIONS

Most SCOM mothers/caregivers do not practice responsive feeding. There is a relationship between the educational level of mothers and fathers and responsive feeding practices. There is a relationship between attitude and practice of responsive feeding with SCOM. Responsive feeding practices were a predictor of SCOM. The practice of responsive feeding protects against SCOM. Optimization of responsive feeding attitudes and practices for toddlers needs to be performed as early as possible to prevent SCOM, especially in families of toddlers with low parental education levels.

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