Effect of Feeding Stimulators on Intake of Complementary Foods among Children Age Six Months to Two Years in Oluyole Local Government Area, Oyo State, Nigeria

ABSTRACT

Aims: To ensure that infant gets adequate nutrition, it's essential to assist the child to eat in a responsive-feeding environment rather than forced-feeding. This study evaluated the effects of feeding-stimulators on intake of complementary-food among infants aged six months to two years.
Study design: The study was a combination of cross sectional and experimental study which involved nursing mothers with infant aged 6-24 months in Oluyole Local Government.
Place and Duration of Study: Nursing mothers who attended primary health care centres in Oluyole Local Government Area, Oyo State were sampled for this study, between January and March, 2021.
Methodology: One hundred and twenty (120) nursing mothers who specified that they had difficulties in feeding their children were sampled for this study. Ninety (90) nursing mothers were selected for intervention while the remaining thirty (30) nursing mothers were used as the control. Structured questionnaire was administered to the nursing mothers and their infants' anthropometry measures were recorded. Data was analyzed using descriptive statistics and inferential statistics (T-test).
Results: Findings revealed that 62.2% of the nursing mothers specified that after introduction of complementary food, their children received the new complementary food. Furthermore, it was discovered that most of the nursing mothers specified that their children accepted the food when they dished the food in a colorful plates and spoon, used toys with sounds, played songs from the phone and played cartoons through phones. There was a significant increase ($t(89) = 2.467$, $P = .02$**) in the food intake level of children with feeding stimulators than infants without feeding stimulators. Likewise, there was a significant improvement in anthropometric measurement among the infants after the usage feeding stimulators.
Conclusion: It was concluded that stimulation consistently benefit child development, and nutritional status. It is recommended that care givers and health-workers ought to be enlightened on the usage of feeding stimulators in children's nutrition.

Keywords: Feeding stimulators, Complementary foods, Nutrition, Children

1. INTRODUCTION

Feeding a child appropriately during his or her 1,000 days' window of opportunity, from the day the child is conceived up to the 24th month, is essential for the wellbeing of that child, thus guaranteeing the achievement of the child's optimum development [1]. The World Health Organization and United Nations International Children's Emergency Fund endorsed the adoption and practice of EBF in the first 26 weeks and immediately after then introducing adequate CF while continuously BF for up age 2 or beyond [2; 3]. However, feeding techniques and consumption of food contribute to nutrient adequacy of infants and dietary habits which can last for a long period [1].The optimal approach to determine child's growth and development is through infant feeding practices. Exclusive infant's breast feeding for up to 6 months is recommended for healthy nursing mothers. Suitable infant feeding is vital to ideal infant and child growth and survival[4].

For infants to grow maximally to their full potential, the care given, responsiveness and stimulation are expedient [5].Stimulators are devices or something that raises the levels of physiological or nervous activity in the body or a person that encourages the development of or increased activity in a state or process [6]. Feeding stimulators in this context include provision of different toys, colourful utensils, and interaction between mother and child through play, songs, or rhymes during the act of feeding to enhance the intake of food. Stimulation is important both for the growing brain and body [5].Stimulating a child improve baby's attention span, memory and nervous system, in other words, stimulating enables child to reach developmental milestone faster. Moreover, adequate nutrition and the presence of both parents during the early years are also crucial to a child's being and all these factors contribute towards a normal healthy adult. However, the stimulation a child receives depends on both family structure and dietary lifestyle [7].

Stimulation and nutrition interventions delivered in the first 2 years of life in low-income and middle-income countries have demonstrated consistent short-term benefits to children's early development and growth outcomes [8]. The first 1000 days are the "prime time" for a young developing brain. This intense period of brain growth and network building capacity happens only once in a lifetime. During this period, the brain's neural pathways supporting communication, understanding, social development and emotional well-being grow rapidly in these first three years [9].It has however been discovered that one reason for poor brain growth is malnutrition. Children who have been severely malnourished as infants has poor academic performances, are more vulnerable to both physical and mental illnesses and have less chance of being productive in their adult years 8].A systematic review of combined stimulation and nutrition interventions in Jamaica, reported that stimulation consistently benefit child development, while nutrition usually improves nutritional status and growth, and sometimes improves child development[9]. Likewise, it was revealed that when an infant develop in a prolonged adverse condition without parental care it disrupts brain development and in like manner, an undernourished child whose care is deficient in affection and stimulation limits the child's intellectual, physical growth and development,with long term effect such as low productivity, poor employment chances and lifelong disability[10].

Infants depend on others to feed them, especially mothers who are the primary caregivers, play a key role in the formation of children's dietary habits and also decide on what the child eats and they determine how the child will be fed [11].Also, the interaction between caregiver and child early in life has both positive and negative effects on nutrition and growth, as well as on the child's cognitive and social development[12; 13].However, the role of the family in how a child learns how to feed through the means or approach that mothers or caregivers use to stimulate feeding cannot be over emphasized. Also, the behaviour and the interaction that occurs during mealtime between mother -child or caregiver- child have been characterized as responsive style is more often associated with the formation of adequate feeding practices, as well as the development of appetite self-regulation by the child[14]. Some of these components of responsive feeding that are effective and stimulate food intake include: responding positively to children by smiling, making eye contact and using words of encouragement; feeding the child slowly and patiently, with a good disposition; waiting for the child to stop eating and watching carefully if the child expresses signs of satiety hence the context in which feeding occurs most be considered in order to provide an environment that is pleasant [15].

The Complementary feeding period is a vital transition time in infant life and unsuitable complementary feeding techniques with related adverse health penalties remain an important public health issue globally, a lot of infant's parents are disturbed about difficulties encountered during feeding. Over 50% of nursing mother's report that at least one of their children do not eat properly during this period[16]. However, the interaction between the mother and child during the act of feeding or being fed has been the focus of research interest in recent years, because the caregiver's characteristics and how he/she relates to the child has a direct impact on the way a child will approach food [17].

According to the Convention of the Right of a Child, every infants and child has the right to good nutrition, and to ensure that infant gets adequate nutrition, it's essential to assist the child to eat in a responsive-feeding environment rather than forced-feeding. Forced-feeding is a common practice in developing countries and despite the dangers associated with it, many mothers are still driven by various reasons in justifying its practice. The practice of forced-feeding is usually borne out of good intentions for the Child's benefit. However, because it is usually with the use of coercion, force, physical restraints or psychological threat, it has been regarded as a form of inhumane and degrading treatment that could lead to unhealthy food habits and other health related consequences [18].

Several cases of child death following force feeding have also been reported globally [19]. Given the psychological trauma forced-feeding may inflict on children, research is needed immediately to discover the acceptability of various feeding practices to enhanced complementary feeding and the impact on infant's nutritional status. This study therefore assessed the effects of feeding stimulators on intake of complementary foods among children aged six to twenty-four months in Oluyole Local Government Area, Oyo State, Nigeria.

2. METHODOLOGY

2.1 Study design
A cross sectional and experimental design was used to study the effect of child feeding stimulators on the intake of complementary foods among nursing mothers with childen (6-24 months) in Oluyole Local Government Area, Oyo State, Nigeria.

2.2 Study Location
The study was conducted among nursing mothers with children between ages 6 to 24 months in Oluyole Local Government Area (OLGA) of Oyo State.Oluyole is a Local Government Area in Oyo State, Nigeria. Its headquarters are in the town of Idi Ayunre. It has an area of 629 km^2 and a population of 290,800 as at 2022 [20].It shares boundaries with four Local Governments, viz.: Ibadan South West, Ibadan South East, Ona Ara Local Government and Ido Local Government all within Ibadan metropolis. It also shares boundaries with Ogun State through Obafemi Owode, Odeda and Ijebu North Local Governments. Oluyole Local Government has ten (10) wards with twenty-six (26) primary health care centres.

2.3 Data Collection Methods and Procedures
Written approval was gotten from the management in-charge of the primary health centers. Two-stage sampling technique was used to select nursing mothers from the primary health care centres. Eight (8) functional primary health centres were randomly selected from the twenty-six primary health centres in Oluyole Local Government. One hundred and twenty (120) nursing mothers who specified that they had difficulties in feeding their children with complementary food were selected from the eight primary health centres using stratified sampling technique (proportional) based on the sampling frame (registers) in the primary health care centres. However, ninety (90) nursing mothers were selected for the intervention and feeding stimulators (such as colorful plates and spoons, video games, toys, colours, etc.) were given to them to use so as to enticed their children with it to see if their child would accept the food who specified that their children were having difficulties in feeding while the remaining thirty (30) nursing mothers served as control. Each primary health centres were visited on all immunization days and nursing mothers who volunteered to participate were recruited using a simple random technique. Structured questionnaire was used to collect data from the consented participants. Verbal consent from the participants was obtained after the objectives of the study were explained to the respondents and their confidentiality was guaranteed. Each randomly selected nursing mothers were administered a structured questionnaire and their children's anthropometry measures were recorded before and after the intervention.

2.4 Statistical Analysis
Statistical Package for Social Science (SPSS version 20) was used. Data collected were analyzed using descriptive statistics such as frequency and percentage. Inferential statistics such as T-test to test significance difference between food intake among children with feeding stimulators and children without feeding stimulators, chi square test was used to elucidate the association between knowledge, perception, use of feeding stimulators and food intake.

3. RESULTS AND DISCUSSION

3.1 Respondents using Feeding Stimulators to enticed their Children during Complementary Feeding
The view of respondents' after usage of feeding stimulators was displayed in Table 1. From the results, it was revealed that 62.2% of the nursing mothers stated that their children received the new complementary food after introduction of feeding stimulators while 37.8% specified that their children still did not received the complementary food. Results showed that 60% of the nursing mothers specified that use of feeding stimulators was a good alternative in order to positively influence the intake of complementary foods among infants. Furthermore, out of the different types of feeding stimulators given to the respondents to use during complementary feeding of their infants, results indicated that 63.3% of the nursing mothers stated that their children accepted the food when they dished the food in a colorful plates and spoon, followed by using of toys with sounds (61.1%), playing of songs from the phone (57.8%) and playing of cartoons through phones (53.3%). On the other hand, 57.8% of the respondents revealed that their children did not received the food when they made used of toys without sound. The interventions diverse in the children's age (6-24 months) and it involved a home-visiting factor even though in numerous research, the home visiting was also accompanied by a succession of group gatherings with the nursing mothers [21; 22].

Table 1. View of Respondents on usage of Feeding Stimulators for their children (n =90)

Variables	Yes Freq. (%)	No Freq. (%)
My child received the new complementary food after introduction of feeding stimulators	56(62.2)	34(37.8)
Use of feeding stimulator is a good alternative in order to positively influence the intake of complementary foods among infants	54(60.0)	36(40.0)
Different types of feeding stimulators used for the intervention		
My child accepted the food when I gave him/her toys with sounds	55(61.1)	35(38.9)
My child accepted the food when I used toys without sound to attract my child	38(42.2)	52(57.8)
I played songs for my child and he/she got attracted to the food and consumed it with little stress	52(57.8)	38(42.2)
My child accepted the food when I played cartoons for her through my phone	48(53.3)	42(46.7)
I made used of a colorful plates and spoon to appeal my child to the food and he/she accepted it.	57(63.3)	37(36.7)

Source: Data Computation, 2021

3.2 Remark of Nursing Mothers after usage of Feeding Stimulators

Table 2 showed the remark of nursing mothers after usage of feeding stimulators. Results revealed that 26.7% of the nursing mothers agreed that use of feeding stimulator was time consuming. Moreover, larger percentage (43.3%) of the nursing mothers agreed that there was need to be vigilant during usage of feeding stimulator so that the child does not put the stimulator inside his/her mouth. Likewise, 38.9 % of the nursing mothers agreed and 15.6% strongly agreed that the child focused more on the feeding stimulator and ignored complementary food. This was in accordance with the outcome of [7]who specified that children were more attached to the feeding stimulator even after the intervention and did not concentrate on their food.Similarly, more than half (35.6%) of the nursing mothers agreed that work schedules of mothers would not allow use of feeding stimulators on intake of complementary foods. Results further indicated that 31.1% of the nursing mothers agreed that lack of knowledge concerning feeding stimulators could hinder the usage. On the other hand, 23.3% of the nursing mothers disagreed with the statement that lack of knowledge concerning feeding stimulators could hinder usage. According to [23], the intervention revealed a significant advantage on nursing mothers' childrearing knowledge and practices. In addition, 32.2% of the nursing mothers agreed that use of feeding stimulators was more stressful. Stimulation in initial childhood can lessenopposing effects of poverty [24]. Field workers stimulated quick child stimulation via amplified mother-child relationship, introduced exciting toys as well as learning material revisedto the infant's age and coached mothers on the usage of toys and creating of safe playing environments for their children[25].Furthermore, [7]reported that nursing mothers were less intrusive and more sensitiveduring the application of stimulation.Also, programmes on early stimulation have been revealed to benefit parenting behaviour of nursing mothers, interaction between mother-child and stimulation level delivered in the home, and home stimulation has been shown to be an independent forecaster of children's mental growth in developing nations in numerous studies especially for vulnerable children[26; 27].

Table 2. Remark of Nursing Mothers after usage of Feeding Stimulators (n=90)

S/N	Statement	Disagree Freq.(%)	Strongly Disagree Freq.(%)	Undecided Freq.(%)	Agree Freq.(%)	Strongly Agree Freq.(%)
1.	Use of feeding stimulator is time consuming	21(23.3)	16(17.8)	16(17.8)	24(26.7)	13(14.2)
2.	Need to be vigilant so that the child does not put the stimulator inside his/her mouth.	10(11.1)	10(11.1)	11(12.2)	39(43.3)	20(22.3)
3.	The child focuses more on the feeding stimulator and ignores complementary foods.	15(16.7)	13(14.4)	13(14.4)	35(38.9)	14(15.6)
4.	Work schedules of mothers will not allow use of feeding stimulators on intake of	15(16.7)	17(18.8)	14(15.6)	32(35.6)	12(13.3)

	complementary foods.					
5.	Lack of knowledge concerning feeding stimulators can hinder usage	21(23.3)	12(13.3)	17(18.9)	28(31.1)	12(13.4)
6.	Use of feeding stimulators are more stressful.	17(18.9)	17(18.9)	16(17.8)	29(32.2)	11(12.2)

Source: Data Computation, 2021

3.3 Nursing mothers not using Feeding Stimulators to enticed their children during Complementary Feeding

Table 3 showed the consumption pattern of nursing mothers' children without using feeding stimulators. Result revealed that 56.7% of the nursing mothers stated that their children received the complementary food without using feeding stimulators but 43.3% of them specified that their children did not received the complementary food.

Table 3. Consumption Pattern of Nursing mothers' children without using Feeding Stimulators (n =30)

Variables	Yes Freq. (%)	No Freq. (%)
My child received the new complementary food without use of feeding stimulators	17(56.7)	13(43.3)

Source: Data Computation, 2021

3.4 Significance Difference in the Food Intake between children without Feeding Stimulators and children with Feeding Stimulators

Table 4 showed the result of the significant difference between food intake between children without feeding stimulators and children with feeding stimulators. Results showed that there was a significant increase in the food intake level of infants with feeding stimulators than children without feeding stimulators t (89) = 2.467, *P* = .02**.

Table 4. T-test Showing the Significant Difference between Food Intake among children without Feeding Stimulators and childrenthat used Feeding Stimulators

Variables	Mean	Std. dev	Std. Error Mean	95%Confidence interval of the difference		T	df	Sig. (2-tailed)
				Lower	Upper			
Food intake between infants without feeding stimulators and infants that used feeding stimulators	.225	.577	.091	.041	.409	2.467	89	.02*

Note: Significant at p<0.05
Source: Data Computation, 2021

3.5 Significance Difference between Weights of children with Feeding Stimulators before and after intervention

Table 5 showed the result of the significant difference between the weight of children with feeding stimulators before and after intervention. The results indicated that statistical significant (t(89) = -8.848,*P* = .00) occurred in the weights among the children with feeding stimulators after the intervention. According to [7], it was reported that the intervention conducted had a positive impact of children's' growth. Likewise, another study revealed that stimulation served as a great benefit to undernourished children's growth but their mental development was yet to be ascertained[27].

Table 5. T-test Showing Significance Difference between Weights of children with Feeding Stimulators

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig (2 tailed)
				Lower	Upper			

Weight Before – Weight After	-1.01400	.81037	.11460	-1.24430	-.78370	-8.848	89	.000

Note: Significant at p<0.05
Source: Data Computation, 2021

3.6 Significance Difference between MUAC of children with Feeding Stimulators before and after intervention

Table 6 disclosed the result of the significant difference between the MUAC of children with feeding stimulators before and after the intervention. The results indicated that there was a statistical significant (*t*(89) = -4.252, *P* = .00) improvement in MUAC among the children after the intervention.

Table 6. T-test Showing Significance Difference between MUAC of children with Feeding Stimulators

				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	Df	Sig (2 tailed)
MUAC Before – MUAC After	-.46400	.77163	.10912	-.68329	-.24471	-4.252	89	.000

Note: Significant at p<0.05
Source: Data Computation, (2021)

3.7 Significance Difference between Heights of children with FeedingStimulators before and after intervention

Table 7 showed the result of the significant difference between the heights of children with feeding stimulators. The results indicated that there was a statistical significant (t(89) = -2.823, *P* = .00) improvement in the height of the children before and after the intervention.

Table 7. T-test Showing Significance Difference between Heights of children with Feeding Stimulators

				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig (2 tailed)
Height Before – Height After	-.42400	1.06187	.15017	-.72578	-.12222	-2.823	89	.000

Note: Significant at p<0.05
Source: Data Computation, 2021

4. CONCLUSION

The study concluded that most of the nursing mothers expressed that their children received the complementary food after introduction of feeding stimulators. Based on the observation after the trial, findings revealed that children consumed their complementary foods through the use of colorful plates and spoons, playing of songs from the phone, toys with sounds and playing of cartoons through phones. In respect to the nursing mothers view, usage of feeding stimulators requires the user to be vigilant so that the child would not put the stimulator inside his/her mouth.

From the hypothesis finding, it was observed that there was a significant increase in the food intake level of children with feeding stimulators than children without feeding stimulators (t(89) = 2.467, *P* = .02**). This implied that the more the use of feeding stimulators, the more increment in the consumption level of children. Also, finding from the significant weight of children with feeding stimulators before and after introduction of feeding stimulators showed that there was a statistically significant improvement between the means of the weight among the children after the intervention (t(89) = -8.848,*P* = .00). The finding further revealed that there was a statistically significant (*t*(89) = -4.252, *P* = .00) improvement between the means of the MUAC before and after the intervention. Furthermore, finding showed that there was a statistically significant (t(89) = -2.823, *P* = .00) improvement in the height of children with feeding stimulators before and after the intervention. This implied that there was a positive impact on the consumption level of children enticed with feeding stimulator during feeding which simultaneously had a positive influence on the children's anthropometry.

CONSENT

"All authors declare that 'written informed consent was obtained from the nursing mothers attending primary health care centres in the study location for publication of this manuscript.

ETHICAL APPROVAL

Written informed consent was obtained from participants. The ethics approval for the implementation of this research was obtained from the ministry of health, Oyo state, Nigeria.

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