ISSN: 2175-7275

ADEQUACY OF SUPPLEMENTARY FEEDING IN THE FIRST YEAR OF LIFE

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ABSTRACT

To evaluate the adequacy of complementary feeding in the sixth and twelfth month of life in children attended at the primary health care of Campina Grande-PB, Brazil, and to

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describe the associated sociodemographic and maternal factors. Overall, 202 children in the first year of lifewere followed between December 2006 and June 2009. During interviews in family health units, monthly questionnaires about food introduction, sociodemographic and maternal factors were applied. Food adequacy was analyzed based on recommendations from the Ministry of Health for the first and second semesters of life. Chi-square and student T tests were used to examine associations between nutritional adequacy and child, maternal andsociodemographic variables.Only one child received adequate food introduction in the first year of life. The population had low income and education. Statistical association was found between maternal age and the introduction of carbohydrates as well as maternal work and the introduction of food preparations. The introduction of sugar was associated with marital cohabitation, *per capita* income and number of pregnancies ($p<0.05$). The introduction of food was inadequate, showing associations between certain kind of food and maternal and sociodemographic factors, suggesting the need for more effective nutrition education in the primary health care.
KEYWORDS: supplementary feeding; breastfeeding; infant nutrition.

NECESSIDADE DE ALIMENTAÇÃO SUPLEMENTAR NO PRIMEIRO ANO DE VIDA.

RESUMO

O objetivo deste estudo foi avaliar a necessidade de alimentação complementar entre o sexto e décimo segundo meses de vida em crianças sendo acompanhadas no Centro de Saúde de Atendimento Primário na cidade de

Campina Grande-PB, Brasil, e descrever os fatores sociais, demográficos e maternos associados. No total, 202, crianças no primeiro ano de vida foram acompanhadas entre Dezembro de 2006 e Junho de 2009. Durante as entrevistas nas unidades de saúde familiar, questionários aplicados ou respondidos mensalmente sobre o início da alimentação, fatores sociais e demográficos e maternos foram analisados. A necessidade e adequação da alimentação foram analisadas baseadas nas recomendações do Ministério da Saúde para o primeiro e segundo semestres de vida. Os testes X quadrado e *t student* foram usados para analisar uma associação entre alimentação adequada ou não e variáveis da criança, sociais, demográficos e maternos. Somente uma criança recebeu introdução alimentar adequada no primeiro ano de vida. Este tipo de população tinha uma renda baixa e poucos anos de educação. Verificou-se uma associação estatística entre idade maternal e a introdução de carboidratos, assim como, entre trabalho materno e a introdução na preparação do alimento. A introdução de açúcar no alimento estava associada com co-habitação maternal, com renda per capita e com número de gravidez e ($p<0.05$). A introdução ou início no uso de alimento era inadequada, mostrando associações estatísticas entre certo tipo de alimento e fatores sociais, demográficos e maternos, indicando que havia necessidade de educação mais eficiente sobre forma de alimentação em relação com os cuidados iniciais de saúde.

PALAVRAS-CHAVE: alimentação suplementar; amamentação; nutrição infantil.

INTRODUCTION

Eating habits are influenced by thefamily cultural and sociodemographic conditions from early age (SANTOS; LIMA; JAVORSKI, 2007; VIEIRA, et al. 2004). Eating behaviors including weaning before the sixth month of age, or inadequate introduction of food during lactation contribute to the formation of eating disorders in adolescence or adulthood (FERREIRA; CASTRO; MENEZES, 2009).

Recommendations from the Ministry of Health (MH) about timely introduction of foodare based on the child's physiological and motor maturity, who are not ready to receive other food except breast milk before six months of age (FRANCESCHINI; DIAS; FREIRE, 2010). From the sixth month on, the introduction should occur gradually, according to the food groups, respecting the tolerance of each child (SANTOS; LIMA; JAVORSKI, 2004).

After completing sixth months, the child should receive three meals per day (two fruit meals and one salt meal/pan food composed of cereals and tubers, legumes, meats and vegetables), which may include boiled egg. In the seventh month, the second salt meal/pan food can be introduced (rice, beans, meat and vegetables). At the end of the first year, the child can enjoy family meals both in lunch and dinner, and fruit without processing (BRASIL, 2009).

Regarding the food processing, the consumption of fresh foods is recommended, avoiding processed and spicy food (FRANCESCHINI; DIAS; FREIRE, 2010; BRASIL, 2009). Liquefied and strained food should be discouraged, with the incentive of preparations cut into small pieces, gradually evolving into the family diet (BRASIL, 2009).

Such guidelines regarding appropriate introduction of complementary food is the base of thechild care at the Family Health Strategy (FHS) within the primary health care. The FHS professionals should promote the exclusive breastfeeding up to six months and the introduction of food according to recommendations from the MS/2009 there after (COUTINHO; GENTIL; TORAL, 2008; ARIMETEA; CASTRO; ROTEMBERG, 2009). This training has been the target of the MHthrough the National Strategy for Healthy Complementary Feeding, in workshops focusing on eating problems occurred

between 2009 and 2011(JAIME et al., 2011).

The educational support provided by the primary health care and the quality of care during the prenatal period are important, as well as other factors may interfere with the adequacy of complementary feeding, such as maternal factors, schooling level, parity, maternal age and their return to the labor market (SANTOS; LIMA; JAVORSKI, 2004), and myths and beliefs brought by family habits (SANGALLI; HENRIQUES; OLIVEIRA, 2010).

The literature reports significant percentages of exclusive breastfeeding inadequacy at the end of the first semester, ranging from 66 to 95%. Thissuggests an inadequate introduction of complementary food, and a need for furtherstudies on the profile of feeding practices during the first year of the life (MARCHIONI; VENÂNCIO; SILVA, 2010; CAETANO, et al. 2010; PALMEIRA; SANTOS; VIANNA, 2011; SIMON; SOUZA; SOUZA, 2009; BERNARDI; JORDÃO; BARROS FILHO, 2009).

Considering a population of women and children being attended at a primary public health care service in Campina Grande/PB, Brazil, since the pregnancy to the end of the first year of life according to the recommendations of the MH/2009 (BRASIL, 2009), this study aims to verify the adequacy of supplementary feeding at the sixth and the twelve monthof life. The study included thesociodemographic and maternal factors.

MATERIAL AND METHODS

This is a longitudinal study with a birth cohort of 202 children in the city of Campina Grande, PB, Brazil, from December 2006 to June 2009. The inclusion of mothers occurred voluntarily during children's gestation to participate through the urban units of the Family Health Program in Campina Grande, PB.

Questionnaires were applied in meetings held at FHS units after prior appointment, or in home visits by trained staff. The data quality control was performed by review of questionnaires applied and repetition whenever necessary. The questionnaires were pre-tested and included questions about breastfeeding, introduction of supplementaryfood besides maternal and sociodemographic data.

Although the data collection was done monthly to minimize memory

bias, the data were grouped into quarters and analyzed in two different follow-up periods: first and second semesters. Thus, the data were best evaluated and compared with recommendations from the MH (2009) (BRASIL, 2009). The food introduced were classified into the following groups: carbohydrates (rice, beans, pasta, bread, cookies, couscous, flour); simple sugars (granulated or refined sugar, sweets, calf's foot jelly), vegetables (fruits and vegetables); protein/dairy products (meat, non-breast milk, egg, yogurt and cheese), liquid (water, tea, juice, coconut water), other preparations such as milk, rice, soup, cake, "pamonha" (corn-paste wrapped with husks), "canjica" (grated corn, sugar, coconut milk and cinnamon), and multimixture (FRANCESCHINI; DIAS; FREIRE, 2010). The adequacy of supplementary feeding of children was assessed according to criteria given in Figure 1.

Figure 1. Feeding classification in the first year of life, acoordingto recommendations from Health Ministry (BRASIL, 2009).

Feedingadequacy	**Time ofintroduction**	
Adequate	1st Semester:	Exclusive breastfeeding
	2nd Semester:	Gradual introduction of foods
Inadequate	1st Semester:	Introduction of some liquid or solid food
	2nd Semester:	Absence of introducing some food group

After the description of the feeding profile of children, hypothesis tests were performed to check for statistical associations between feeding adequacy / inadequacy and child, maternal and sociodemographic variables. The variables studied were: maternal age (in years), schooling level (years of school), per capita family income (in Brazilian currency), marital cohabitation, maternal work with remuneration, maternal smoking, gestational age, inter-birth interval, number of pregnancies, number of prenatal visits, type of delivery, birth weight and prematurity. The chi-square test was used for categorical variables and the Student test was used for continuous variable, adopting a significance level of $p<0.05$ (CI 95%).

Data were double entered and analyzed using SPSS 17. The study was approved by the ethics committee for human research at the State

University of Paraiba (n.0334.0.133.000-06), and data were collected by signing the Informed Consent Form by the child's mother or legal guardian.

RESULTS

The analysis of cohort data indicates an average birth weight of 3.300g, ranging from 1.680 to 4.630g. Regarding maternal data, age ranged from 18 to 41 years with mean age of 24 years and the mean schooling level was seven years of study, ranging from 0 to 13 years. As for the number of pre-natal visits, the average was seven visits, with minimum of two and maximum of 15. The mean *per capita* income was R$ 62.13, ranging from zero to R$ 666.00.

The food profile showed very high inadequacy percentages, stressing the fact that only 7.8% of the children studied had exclusive breastfeeding up to six months (first semester), and of these, only one child (0.5%) received adequate supplementary feeding. Thus, in the second semester, the introduction of supplementary food occurred to a lesser extent than expected. Table 1 shows the percentages of introduction of different food groups in the first year of life.It was observed a significant percentage of non introduction of some food groups throughout the first year of life such as sugars (44.5%), vegetables (14.4%) and consume of other food preparations containing two or more food in the same period (26.4%).

Table 1. Food groups according to their introduction in the first year of life. HFS, Campina Grande, 2005-2008.

Foodgroup	Introduced in the 1st semester		Introduced in the 2nd semester		Not introduced in the first year of life	
	n	%	n	%	n	%
Carbohydrates	157	77.72	26	12.87	19	9.41
Vegetables	150	74.26	23	11.39	29	14.36
Proteinsanddairy	174	86.14	17	8.42	11	5.45
Liquids	187	92.27	4	1.98	11	5.45
Sugars	86	42.57	26	12.87	90	44.55
Otherpreparations	113	55.94	36	17.82	53	26.24

The adequacy of complementary feeding in children in this cohort can be seen in Table 2, which shows that the food inadequacy values in the different food groups ranged from 55.4% to 98.0%.

Table 2. Adequacy of supplementary foods as recommended by the MH/2009.HFS, Campina Grande, 2005-2008.

Foodgroup	Adequacy regarding introduction according to MH/2009			
	Adequate		Inadequate	
	n	%	n	%
Carbohydrates	26	12.87	176	87.13
Vegetables	23	11.39	179	88.61
Proteinsanddairy	17	8.42	185	91.58
Liquids	4	1.98	198	98.02
Sugars	90	44.55	112	55.45
Otherpreparations	36	17.82	166	82.18

The analysis of sociodemographicand maternal factors indicated a statistically significant association ($p<0.05$) between maternal age and the introduction of carbohydrates as well as between maternal age and the introduction of liquids. It was also found that the introduction of sugar/sweets was associated with the following factors: *per capita* family income, number of pregnancies and marital cohabitation. Finally, maternal work was associated with the introduction of food preparations (Table 3).

DISCUSSION

In spite of recommendations from the Ministry of Health (MH) on exclusive breastfeeding up to at least six months, early introduction of food was observed in the majority of children while theinadequacy occurred in almost all cases. This fact has been detected both in national and international studies (MARCHIONI; VENÂNCIO; SILVA, 2010); SIMON; SOUZA; SOUZA, 2009; BERNARDI; JORDÃO; BARROS FILHO, 2009; BRASIL, 2005; CAMPOS et al., 2010; OLIVEIRA et al., 2005). However the studies in the literature donot consider the classification of complementary feeding according to the food group; this study shows the early introduction of all groups, with emphasis to liquids followed by protein/dairy group.

Table 3. Sociodemographic and maternal factors and their significance values (*p-values*) in relation to the adequacy of complementary feeding, Campina Grande, PB, 2005-2008.

		Foodgroups (*p*-values)					
FACTORS	**n (%)**	Sugars/ sweets	Carbohydrates	Liquids	Preparations	Proteins/ Dairy	Vegetables
Marital cohabitation Yes No	141(89.2 %) 17(10.8%)	**0.022***	–	–	0.504	–	0.499
Maternal work Yes No	85(48.9 %) 89(51.1 %)	0.267	0.897	0.293	**0.025**	0.820	0.703
Smoking Yes No	17(9.8 %) 157(90.2 %)	0.384*	0.112*	0.339 *	0.616*	0.098*	0.277*
Typeofdelivery Vaginal Cesarean	110(69.6 %) 48(30.4 %)	0.070	0.273	0.645	0.325	0.099	0.499
Firstgestation Yes No	57(29.1 %) 139(70.9 %)	0.297	0.285	0.331	0.229	0.079	0.433
Maternal age† (18 to 49 years)		0.382	**0.022**	**0.040**	0.384	0.385	0.108

		Foodgroups (*p*-values)					
FACTORS	**n (%)**	Sugars/s weets	Carbohy-drates	Liquids	Preparations	Proteins/ Dairy	Vegetables
Schoolinglevel† (0to13 years)	-	0.189	0.189	0.797	0.413	0.755	0.969
People in the household† (1 to 10)	-	0.979	0.322	0.204	0.397	0.892	0.831
Prenatalvisits† (2to 15)	-	0.990	0.204	0.902	0.840	0.671	0.410
***Per capita*income† (R$)** (0to 666.66)	-	**0.049**	0.732	0.847	0.717	0.247	0.214
Inter-birth interval† (0 to 9 years)	-	0.517	0.382	0.256	0.248	0.504	0.877

Numberofpregnancies† (1to7)	-	**0.008**	0.244	0.239	0.842	0.135	0.894

* Fisher'sexacttest
†ContinuousVariables

The literature shows that the early introduction of liquids influences earlyweaning (SIMON; SOUZA; SOUZA, 2009). The frequent use of tea in the early months seeking to alleviate cramps common in the first months, although there are no recommendations for such introduction, reflects cultural influences suggesting the need for the consumption of fluids to rehydrate the child, especially in hot climates (SIMON; SOUZA; SOUZA, 2009).

A study carried out in four South Asian countries reported a considerable consumption of pure water, juices or liquids other than milk in children under six months of age (CORRÊA et al., 2009). The introduction of water, milk powder and tea was reported in a study in Campinas, with children under 24 months as one of the factors responsible for premature weaning (BERNARDI; JORDÃO; BARROS FILHO, 2009). Similar behavior was observed in northeastern Brazil by Santos, Lima and Javorski (2007) in Recife, where most mothers start the early introduction of food by offering juices. The author considers that such behavior suffers influence from the guidelines of the MH (BRASIL, 2005), prior to 2009, which recommended only four months of exclusive breastfeeding. Corrêa et al. (2009), in a study carried out in Florianópolis, observed that 80% of the 516 children studied received fruit juice before six months, 77.5% of them received natural juice associated with breastfeeding while 36.8% received modified milk in substitution to breast milk.

Protein/dairy food showed the second highest rate of introduction in the first semester, associated with arather low percentage of exclusive breastfeeding at six months (7.8%). It is reasonable to say that this is the result of the introduction of cow's milk, often added of thickener, a common practice in this phase. This practice is related to cultural aspects, and also to the ease of access, convenience, also being encouraged by the television media and advertisement (PALMEIRA; SANTOS; VIANNA, 2011; REA, 2003) of the food industry.

A study carried out at the Brazilian capitals and Federal District to assess the infant feeding up to the sixth month using a 24-h recall corroborates the early introduction of protein food[19]. In this study, the northeastern region showed a high introduction of dairy food, based on the consumption of porridge/meals. Calcium from dairy products reduce the optimal absorption of iron, a condition which, if extended in the second semester of life associated with low consumption of meat, contributes to a public health nutritional problem in Brazil - iron deficiency (BORTOLINI; VITOLO, 2010).

Vegetables were introduced early in 74.26% of cases, confirming the findings of other studies (SANTOS; LIMA; JAVORSKI, 2004; PALMEIRA; SANTOS; VIANNA, 2011; SIMON; SOUZA; SOUZA, 2009). In contrast, in 14.36% of cases, these foods were not introduced during the first year of age, which is a significant percentage, indicating a diet poor in vitamins and minerals, possibly reflecting family eating habits.

As for the consumption of food preparations with two or more kind of food, even if introduced early in 55.94% of cases, there was a significant percentage (44.55%) of non-introduction during the first year. This characterizes a monotonous food profile in the second semester of life, possibly leading to deficiencies – especially of vitamin A, iron and zinc - typical in children under two years, according to findings in different regions of Brazil (BORTOLINI; VITOLO, 2010).

The group of carbohydrates, which is associated with the consumption of milk formulas, is widely used in the food routine of the Northeasterner, in many cases, as a substitute for the family meal due to cultural influences and poor income conditions. Part of carbohydrates compose the group of sugars which, in turn, are used in the preparation of some formulas or in preparations with milk and fruit - in the so-called enriched milk, usually offered to children under one year.

Sugars showed a lower food introduction percentage compared to all other groups during the first year of life, suggesting a positive practice. However, it is known that the consumption of sugar/sweets is high in the Brazilian population as a whole (LEVY; CLARO; MONTEIRO, 2010; GIMENO et al., 2011), and this group

is part of the composition of many industrialized food, particularly thickeners or dairy preparations, as well as in homemade preparations such as cakes and cookies. Thus, it is likely that there has been an underestimation by mothers in relation to the consumption of this food group, which would reflect a low perception of the actual consumption of sugars, as this would have been considered only when consumed in its pure form.

In this study, parity and family income appeared to be factors associated with adequacy of the introduction of sugars as a food supplement. It was observed that a higher number of children were associated with the early introduction of sugar. It is reasonable to say that to have many children demands more care, implying in different form of preparationsand a higher offer of industrialized food, which predisposes to a higher consumption of sugar.

Marital cohabitation, which was also related to the introduction of sugar/sweets, may have similar behavior to parity due to the excess of household activities, including assistance to husband, leaving less time for the preparation of food appropriate to the child's age.

Regarding the per capita income, it was observed that lower income favors the consumption of sugar. This observation is justified in literature by its low cost, easy accessibility and for providing better flavor to preparations (AQUINO; PHILIPPI, 2002).

Maternal age was associated with a suitable introduction of carbohydrates, where younger mothers introduced these foods at the beginning of the sixth month of the child's life. This relationship varies with the findings of other studies carried out in European countries, showing both similar (MARCHIONI; VENÂNCIO; SILVA, 2010) and dissimilar results (DIBLEY et al., 2010), suggesting the need for further investigation. This factor was also associated with the introduction of liquids, possibly due to the insecurity common of younger mothers regarding food behavior, who are instructed by grandmothers to introduce liquids before the sixth month due to for fear of dehydration (SANTOS; LIMA; JAVORSKI, 2004; SANGALLI; HENRIQUES; OLIVEIRA, 2010).

Maternal work was associated with the introduction of food preparations before six months of age.

Mothers who did not work introduced preparations with two or more types of food only at the end of the sixth month, as recommended by the different guidelines on this topic. Similar to other findings (SIMON; SOUZA; SOUZA, 2009; CORRÊA et al., 2009; SALDIVA et al., 2011), it is understood that mothers who do not work find more time in the care to their children feeling safer by being available at mealtimes.

The factors associated with adequacy of complementary feeding need to be better understood primarily by primary care health professionals in educational guidelines. Although continuing education is the focus of health promotion policies, there are weaknesses in relation to the strategies used by professionals, requiring further knowledge for both professionals and users with the goal of increasing adherence to recommended feeding behaviors (FERREIRA; CASTRO; MENEZES, 2009).

Prenatal care is crucial in improving this goal, according to results of studies conducted in several countries, which it was observed that a greater number of visits were a defining factor for a timely complementary feeding (DIBLEY et al., 2010). However, it was found that not only the number of visits to health professionals has influenced the results, but also the quality of monitoring during prenatal, postpartum and childcare.

The literature has shown association between early introduction of foods and onset of chronic diseases (CAETANO et al., 2010; SIMON; SOUZA; SOUZA, 2009; ROSENBAVER; HERZIG; GIANI, 2008). Inadequate nutrition is related to the future health of the individual, leading to the development of non-communicable chronic diseases, with consequences on the quality of life and productivity, in addition to financial burden to the public health system (SANTOS; LIMA; JAVORSKI, 2004).

Thus, the knowledge of factors associated with inadequate introduction of food becomes relevant, which is a behavior that persists despite evidence about the damage caused throughout lifetime.

AKNOWLEDGMENTS

To Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the financial support (Ed 232006 Health

Management. Process number: 409542/2006-7) and to Health Municipality Secretary of Campina Grande-PB, Brazil.

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Recebido em: 02-12-2014
Aprovado em: 31-03-2015