

# Dietary errors in the diet of children attending nurseries of public daycare centers in São Paulo city, Brazil

*Erros alimentares na dieta de crianças frequentadoras de berçários em creches públicas no município de São Paulo, Brasil*

*Errores alimentares en dietas de niños frequentadores de nidos en guarderías públicas en el municipio de São Paulo, Brasil*

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## ABSTRACT

**Objective:** To describe the dietary errors occurring when supplementary feeding is introduced and non-maternal milk is offered to children attending public daycare centers in the city of São Paulo, Brazil.

**Methods:** Cross-sectional and descriptive study of 255 children aged between five to 29 months. Pre-coded and structured questionnaires with open and closed questions were developed for data collection that occurred between April and November 2007. Such data were transcribed and analyzed by Epi-Info 2000 statistical software. The analyzed variables were the introduction of non-maternal milk, the introduction of foods and the initial solidity of supplementary feeding.

**Results:** The introduction of non-maternal milk occurred in 40% of children aged up to three months and in 78% up to six months. By the age of three months, approximately 50% received non-dairy liquids and 15%, strained fruits, vegetables, greens and meat. Regarding the introduction of non-maternal milk, 68% of babies received cow milk and 31%, infant formulas. Liver and fish were the latest foods to be offered. Regarding solidity of meals, 49% were inadequate.

**Conclusions:** The fact that children attend public daycare centers points out the importance to properly qualify the professionals who work in such places and are eventually responsible for introducing the supplementary feeding.

**Key-words:** supplementary feeding; food consumption; child day care centers; infant.

## RESUMO

**Objetivo:** Descrever os erros alimentares presentes na introdução da alimentação complementar e na oferta de leite não materno em crianças frequentadoras de creches públicas do município de São Paulo (SP).

**Métodos:** Estudo descritivo transversal, composto por 255 crianças, com faixa etária entre cinco e 29 meses. Os questionários estruturados e pré-codificados, com perguntas abertas e fechadas, foram elaborados para a coleta de dados, que ocorreu entre abril e novembro de 2007. Estes foram transcritos e analisados no programa estatístico Epi-Info 2000. As variáveis avaliadas foram a introdução de leite não materno, a introdução de alimentos e a consistência inicial da alimentação complementar.

**Resultados:** A introdução do leite não materno ocorreu em 40% das crianças até três meses e em 78% até seis meses. Aos três meses, aproximadamente 50% recebiam líquidos não lácteos e 15%, papas de frutas, legumes, verduras e carnes. Na introdução do leite não materno, 68% dos bebês receberam leite de vaca e 31%, fórmulas infantis. Fígado e peixe foram os alimentos mais tardiamente oferecidos. Quanto à consistência das refeições oferecidas, 49% foram inadequadas.

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**Conclusões:** O fato de as crianças serem frequentadoras de creches públicas aponta para a importância da capacitação dos profissionais que nelas atuam e que, eventualmente, são os responsáveis pela introdução da alimentação complementar.

**Palavras-chave:** suplementação alimentar; consumo de alimentos; creches; lactente.

## RESUMEN

**Objetivo:** Describir los errores alimentares presentes en la introducción de la alimentación complementar y en la oferta de leche no materna en niños frequentadores de guarderías públicas en el municipio de São Paulo.

**Métodos:** Estudio descriptivo transversal, compuesto de 255 niños en la franja de edad entre 5 y 29 meses. Los cuestionarios estructurados y precodificados, con preguntas abiertas y cerradas, fueron elaborados para la recolección de datos, que tuvo lugar entre abril y noviembre de 2007. Éstos fueron transcritos y analizados en el programa estadístico Epi-Info 2000. Las variables evaluadas fueron la introducción de leche no materna, introducción de alimentos y la consistencia inicial de la alimentación complementaria.

**Resultados:** La introducción de la leche no materna ocurrió en 40% de los niños hasta 3 meses y en 78% de los niños hasta 6 meses. A los 3 meses de edad, un 50% recibía líquidos no lácteos y un 15% papillas de frutas, legumbres, verduras y carnes. En la introducción de la leche no materna, 68% de los bebés recibieron leche de vaca y 31%, fórmulas infantiles. Hígado y pescado fueron los alimentos más tardíamente ofrecidos. Respecto a la consistencia de las comidas ofrecidas, el 49% fue inadecuada.

**Conclusiones:** El hecho de que los niños son frequentadores de guarderías públicas señala la importancia de la capacitación de los profesionales que ahí actúan, y que eventualmente son los responsables de la introducción de la alimentación complementar.

**Palabras-clave:** alimentación complementar; consumo de alimentos; guarderías; lactante.

## Introduction

Nutrition during the first years of life is of fundamental importance for child development, because it is responsible for growth and weight gain, in addition to psychomotor development and prevention of both chronic and acute diseases. To achieve all this, breastfeeding should last for 24 months or more, being exclusive until sixth months, at which point

complementary feeding should be introduced, contributing to meeting the child's nutritional requirements in this new phase of development<sup>(1-4)</sup>.

Over recent decades, there has been considerable progress worldwide in terms of actions to encourage and promote breastfeeding, but this is not true with relation to complementary feeding, which is habitually begun at the wrong time and is often nutritionally inadequate and unsafe from a microbiological point of view<sup>(1,2,5,6)</sup>. Information on the least harmful methods of substituting breastmilk when breastfeeding is impossible is also little publicized<sup>(7,8)</sup>.

Premature introduction of complementary foods during infancy is harmful, both because of the reduction or withdrawal of breastmilk and also because of exposure to factors that can be harmful to the child's health, such as consumption of foods that have been incorrectly handled and the use of utensils such as bottles which increase the chance of contamination and the risk of diarrhea. In contrast, the immunological properties of breastfeeding mean that it acts to prevent gastrointestinal diseases, not only in developing societies but also in the developed world, and offers better weight and height gain in comparison with children who are not exclusively breastfed<sup>(1-4,9)</sup>.

Unhealthy dietary practices, especially the premature introduction of unfortified cow's milk, also have a negative impact on iron bioavailability. Establishing good complementary feeding practices, with the introduction of meats and vegetables rich in vitamin C, which increases the availability of iron in other foods, may be important for prevention of iron deficiency anemia - the specific nutritional deficiency that is most prevalent in this age group worldwide<sup>(10,11)</sup>.

However, the entry of women into the employment market and the resulting demand for institutions that care for and educate their children may cause a significant impact on their diets. Even though Brazilian law protects breastfeeding women who work, with the right to breaks for breastfeeding and daycare provision at the place of work, or nearby, in addition to 6-months' maternity leave, in practice, many women do not receive the benefits set out in these policies<sup>(12-14)</sup>.

When mothers are not available to care for their children, they often transfer the care of their infants to institutions known as day-care centers, where the children remain from 8 to 12 hours per day. The menus provided at these institutions are often monotonous, with a predominance of milk-based foods, premature introduction of sugar, tinned foods, processed meat products, desserts and other processed foods. It is necessary that these children be breastfed, both at home and at daycare and that the introduction of new foods be encouraged,

preferably natural foods such as cereals, vegetables, meat and pulses<sup>(15-17)</sup>.

In view of the important impact on health, growth and development resulting from the acquisition of healthy dietary habits during the first years of life and the harm that unhealthy nutrition can cause, the objective of this study is to describe the dietary errors occurring when introducing complementary foods and providing milk other than breastmilk (hereafter non-breast milk) to children attending public and philanthropic daycare centers in the city of São Paulo.

## Methods

This was a descriptive cross-sectional study, which is part of a larger project conducted by the *Universidade Federal de São Paulo*: the "Effective Daycare Project" studying the impact of training the education professionals at public/philanthropic daycare centers in hygiene and dietary practices and infant health and nutrition. The study was a two-phase randomized institutional trial, with simultaneous control and 7-months' follow-up, conducted between April and November of 2007 with the objective of assessing the effect of training the daycare staff on the infants' health, on knowledge acquisition and on changing practices<sup>(11,18,19)</sup>.

At the start of the project, 36 daycare centers were contacted, all run by the education department of Santo Amaro, São Paulo. Sixteen of them were visited by the research team, taking into

account ease of transport and access. After the initial contact and the information-gathering visits, the selection method proposed by Beghin<sup>(20)</sup> was used, with the criteria of priority being the largest number of education professionals and infants, safety for conducting the research, no previous health education interventions, the receptivity of the institution and ease of access. On this basis, four public daycare centers and four philanthropic daycare centers were selected.

The study population comprised 255 children of both sexes, aged 5 to 29 months, who were authorized to take part by their parents or guardians, who in turn signed free and informed consent forms. They regularly attended one of the 8 chosen public and philanthropic daycare centers. Children were excluded from the study if they had Down syndrome (n=2), cerebral palsy (n=2) or a genetic syndrome (n=1), if their parents or guardians refused to sign a free and informed consent form (n=2) or if they were absent on the data collection days (n=18), making a total sample loss of 8.9%.

Structured, precoded questionnaires including both open and closed questions were produced and tested in advance of data collection, which was conducted by the project's duly-trained research team between May and November of 2007.

A manual was written for these instruments, containing instructions for the interviewers and the coding for the variables, in order to standardize notation and analysis of the data. All of the questionnaires were analyzed for internal consistency before being input. The data were double-input, with verification for

**Table 1** - Distribution of 255 children attending public daycare centers in the city of São Paulo, by age of introduction of water and complementary foods, 2007

Foods	0-3m	4-6m	7-9m	10-12m	>12m	Not Introduced	Information not provided
	%	%*	%*	%*	%*	%	%
Water	53.3	93.3	98.0	98.8	98.8	0.4	0.8
Non-breastmilk	40.0	78.4	90.2	97.6	100.0	0	0
Natural juice	29.8	86.7	94.9	98.0	98.0	0.8	1.2
Fruit mash	15.7	84.3	94.1	97.6	98.0	1.6	0.4
Vegetable mash	16.5	87.5	96.9	98.4	99.2	0.4	0.4
Beans	13.3	72.9	90.2	98.4	99.6	0	0.4
Vegetables (green leaves)	15.3	81.6	90.6	92.5	93.7	5.9	0.4
Eggs	5.5	42.4	62.0	81.2	84.3	15.3	0.4
Beef	11.8	76.1	90.6	92.2	98.4	1.2	0.4
Chicken	13.3	80.4	93.3	98.0	98.8	0.8	0.4
Liver	5.9	39.6	55.7	64.3	66.7	32.9	0.4
Fish	2.0	21.6	33.3	51.4	55.3	44.7	0

\* Accumulated percentages  
m: months.

**Table 2** - Types of milk consumed when non-breastmilk is introduced to the diets of children attending public daycare centers in the city of São Paulo, 2007

Type of milk	n	%
Powdered cow's milk	117	45.9
Infant formula	78	30.6
Unmodified liquid cow's milk	57	22.3
Diluted liquid cow's milk	3	1.2
Total	255	100

**Table 3** - Consistency of savory meals given when introduced to children attending public daycare centers in the city of São Paulo, 2007

Consistency	n	%
Mashed with fork	121	47.4
Liquidized	105	41.2
Strained	21	8.2
Unmodified family meals	4	1.6
Modified family meals	2	0.8
No information provided	2	0.8
Total	255	100

error-correction, and analyzed in the statistical program Epi-Info 2000, version 3.4.3<sup>(21)</sup>.

The variables analyzed were introduction of non-breastmilk, introduction of complementary foods and the initial consistency of complementary foods, on the basis of the answers to the 24 questions on the questionnaires. For each item, the age of introduction was recorded in months, in observance of recommendations from the Brazilian Ministry of Health and the World Health Organization (WHO)<sup>(2,7)</sup>.

This project was approved by the Research Ethics Committee at the *Universidade Federal de São Paulo*, to which it is affiliated.

## Results

There was a slight predominance of boys among the children studied (52.9%). Median age was 19 months (range: 5-29).

Table 1 lists accumulated percentages of children by age of introduction of complementary foods. It will be observed that water, juices and non-breastmilk are already being given by 3 months.

Table 2 lists the types of non-breastmilk given to children who were not exclusively breastfed. Note that cow's milk, whether in unaltered liquid form or powdered or diluted, was the most common substitute.

Table 3 lists the consistencies of savory meals. Note the predominance of mashing with a fork, followed by liquidizing.

## Discussion

Despite all of the benefits and advantages that exclusive breastfeeding offers for a child's health, in our population it is not commonly practiced up to 6 months<sup>(1,22-24)</sup>. Estimated median breastfeeding duration was 341.6 days (11.2 months) in Brazilian state capitals<sup>(25)</sup>. In this study, introduction of non-breastmilk, which characterizes the start of the predominant breastfeeding period, had occurred in 40% of children by 3 months and in 78.4% by 6 months. Similar findings were reported in a study by Souza *et al*, which investigated the dietary practices during the first year of life of children cared for at health centers linked to Medical Schools in the city of São Paulo. They observed that 51% were already being given non-breastmilk at 3 months and 75.2% at 6 months<sup>(26)</sup>. The increased use of non-breastmilk in our study may be the result of the fact that these children attend daycare which very often is not close to where their mothers work, making it impossible for them to breastfeed every time it is required<sup>(15,16)</sup>.

With relation to the type of non-breastmilk introduced, 68.2% of the babies studied were given cow's milk and 30.6% infant formula. Premature consumption of cow's milk is associated with anemia, due to the low quantity of bioavailable iron and high concentrations of calcium. Studies have also shown that premature introduction can cause micro-hemorrhages in the immature gastrointestinal tract, leading to blood loss<sup>(10)</sup>. Salvioli *et al*<sup>(27)</sup> studied children less than 6 months old between 1983 and 1992 and found a considerable reduction in the prevalence of iron deficiency and of iron deficiency anemia associated with a decrease in feeding with cow's milk, increased use of iron-fortified infant formula and greater prevalence and duration of breastfeeding.

The composition of cow's milk is also inappropriate for infants in terms of macronutrients, with high concentrations of protein that can overload immature kidneys and cause allergic reactions, deficiencies of the oligosaccharides that promote protection against infections, and an absence of docosahexanoic (DHA) and arachidonic (ARA) polyunsaturated long chain fatty acids, which are important for children's neurological development. Some infant formulas have DHA and ARA added to their composition, but this may not confer advantages since they may not be as effective as the composition of breastmilk<sup>(1)</sup>.

The use of infant formula as a substitute for breastfeeding should not be encouraged either, since, in addition to the risks

linked to the lack of immunological protection that breastfeeding confers, the mother-child bonding process is compromised and the child's facial muscles do not develop properly because of the lack of stimulation from suckling at the breast. Furthermore, the infant is also exposed to a high risk of contamination from babies' bottles, the use of which demands that the mother or carer is able to ensure hygiene during preparation and to understand the dilution instructions on formula labels<sup>(22)</sup>.

When it is impossible to breastfeed a child, the best alternative appropriate to the situation should be chosen, such as the child's mother's expressed breastmilk or milk from a human milk bank or even a formulated substitute fed by cup<sup>(2)</sup>. However, what was actually observed in this study was a predominance of unmodified cow's milk being given to substitute or complement breastmilk; either due to a lack of information or to the greatly lower cost when compared with commercial infant formulas. When financial resources are scarce, homemade formulas, such as diluted cow's milk, which was given to just 1.2% of the children in this study, are less harmful than pure cow's milk. In such cases, where unfortified milk is introduced, iron supplementation is necessary to prevent iron deficiency anemia and even children on exclusive breastfeeding should be given iron from 4 to 6 months onwards<sup>(7,28,29)</sup>.

Complementary feeding was introduced prematurely to the children in this study. At 3 months, approximately 50% of them were being given non-milk liquids and 15% mashes of fruit, vegetables, greens and meat, in line with results from other studies<sup>(23,25,30-33)</sup>. The recommendation, however, is that complementary foods should only be introduced from 6 months onwards, when the child's nutritional requirements exceed that which can be provided by exclusive breastfeeding, thereby guaranteeing sufficient energy, protein and micronutrients. Foods must be safe – prepared and stored hygienically – and should be fed to babies slowly and gradually, without rigidly fixed mealtimes, respecting the child's appetite and satiety, and breastfeeding should be continued<sup>(2)</sup>.

Liver and fish were the last foods to be introduced: from 7 to 9 months, 55.7% of the children had eaten liver and 33.3% fish. With this diet it is unlikely that a sufficient quantity of iron will be provided, emphasizing the importance of iron-rich foods in

complementary feeding. A dietary survey of three daycare centers in Brasília found that a negligible quantity of fish and offal was used in meals. The low availability of these foods at daycare centers may be contributing to the high rates of iron deficiency anemia found in children in this age group<sup>(16,17)</sup>.

During the first years of life, the diet should be rich in iron including beef, offal, chicken and fish, but even so it may not meet the child's requirements because of the small gastric volume. Pulses can be a good source of iron if eaten together with foods that are rich in vitamin C, which aids in absorption of non-heme iron. In this study, 90.2% of the children aged 7 to 9 months were eating beans. In addition to iron, foods of animal origin are also good sources of protein, zinc, folate and vitamin A<sup>(1,2,10)</sup>.

With regard to the consistency of foods, 49.4% were liquidized and strained during preparation, which is not indicated because chewing is not stimulated and it makes it difficult to distinguish the textures, flavors and colors of new foods. Introductory complementary foods should be prepared as firm mashes, prepared with a fork, and more solid foods should then be gradually introduced, in order to develop the facial musculature and the ability to chew. From 8 months onwards, children can eat the same food as the rest of the family<sup>(1,2,34,35)</sup>.

In conclusion, the results of this study have demonstrated that errors in the introduction of complementary feeding to children at these daycare centers were common. These included the age of introduction, consistency and type of foods and particularly the premature use of non-breast milk and other liquids. This practice has a direct impact on the success of breastfeeding campaigns, since this mode of breastfeeding is not ideal and is a long way from what is recommended in order to obtain the protective and potential effects. Furthermore, the fact that these children attend public daycare centers highlights the importance of training the professionals who work there, since they are caring for children who should still be on exclusive breastfeeding and are jointly responsible for the introduction of complementary foods. This study has therefore contributed to illustrating how important it is that these professionals be taught about the importance of correct breastfeeding and complementary feeding for the success of nutrition during the first years of life and, consequently, for good growth and development.

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