

Complementary feeding: Study on prevalence of food intake in two Health Centers of São Paulo City

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SUMMARY.The infant feeding practices in the first year of life are of fundamental importance for their growth and development. This study was carried out aiming at checking on the prevalence of food intake by the infants during their first year of life. One-hundred-and-seventy-five children aged up to one year, attended to in two Health Centers of São Paulo city, Brazil, participated in this study. Their feeding practices, obtained through the *status quo* approach, were analyzed through multiple logistic regression models, using curves of prevalence for complementary food consumption. Fruit was the first solid food to be part of the infant diet, followed by vegetables, cereal, meat and/or eggs and beans. Animal-protein-containing source foods (meat and eggs) entered the diet much later, being consumed by practically all children only at the end of their first year of life. The early introduction of complementary foods into the infant diet was made evident. The introduction of solid foods to complement breastfeeding is started with low-calorie density foods, in disagreement with the recommendations for Brazilian children. Results of this paper disclose a need for having programmatic actions in health education being carried out, in special those regarding exclusive breastfeeding promotion and orientation on the adequate introduction of complementary feeding.

Key-words: Infant nutrition, weaning, complementary feeding.

RESUMO. Alimentação complementar: Estudo da prevalência de consumo de alimentos em dois Centros de Saúde do Município de São Paulo. A alimentação da criança no primeiro ano de vida é fundamental para o seu crescimento e desenvolvimento. Este estudo foi delineado com o objetivo de verificar a prevalência de consumo de alimentos no primeiro ano de vida. Participaram do estudo 175 crianças com até um ano de idade, atendidas em dois Centros de Saúde do município de São Paulo, Brasil. A prática alimentar, obtida por status quo, foi analisada utilizando modelos de regressão logística múltipla, por meio de curvas de prevalência para o consumo de alimentos complementares. O primeiro alimento sólido a fazer parte da dieta infantil foi a fruta, seguindo-se as hortaliças, cereais, carnes e/ou ovos e feijão. Os alimentos fonte de proteína animal (carne e ovos) entraram na dieta mais tardiamente, sendo consumido por praticamente todas as crianças somente ao final do primeiro ano. Evidenciou-se a introdução precoce de alimentos complementares, com alimentos de baixa densidade calórica, em desacordo com as recomendações para as crianças brasileiras. Os resultados deste trabalho evidenciam a necessidade de ações programáticas em educação em saúde, em especial incentivo ao aleitamento materno exclusivo e orientação de introdução da alimentação complementar adequada.

Palavras chave: Lactente, alimentação complementar, alimentação do lactente.

INTRODUCTION

Feeding is of fundamental importance for the growth and development of children during their first year of life, being in an intimate relationship with their health at short-, medium- and long-term (1-3).

Changing from breastfeeding to family feeding is rather a complex process and decisions taken on when and how to start and end this process are based on multiple factors: biological, cultural, social and economical (4-6).

It is largely agreed that mother's milk is the best source of nutrients for the suckling infant, there existing, also, a general consensus on the benefits of having the child be exclusively breastfed in his first months of life. Breastfeeding

should be extended as long as possible, preferably up to the age of two, according to the World Health Organization-WHO (7). However, scientific advances in this field have brought about changes in the paradigms that had been guiding the recommendations on infant diet in the last decades (7-11).

The term "complementary food" is preferred to "weaning food" in order to emphasize that breastfeeding should not be stopped when the suckling infant starts contact with foods consumed by his family or culture (7).

The best age to start complementary feeding is still a controversial subject. Traditional recommendations favoring that it should be started about 4 to 6 months of age have been target of criticism and, nowadays, research findings suggest that before the age of six months complementary feeding is

unnecessary in breastfed children (8, 12-16).

A complement to mother's milk from six months of age is necessary in order to attain the nutritional needs of the child that are not being supplied anymore by exclusive breastfeeding. Energy-density, adequate intake of protein and, a variety of foods in the child's diet are essential elements that should be contemplated in a complementary feeding. Energy-density is one of the most important items when one is selecting which type of foods and mixtures should supplement the mother's milk. Consumption of low-energy density foods such as mashed fruits and soups, associated with the occurrence of diarrheic episodes caused by food contamination due to inadequate preparation under poor hygiene conditions, might even put the nutritional status of children in jeopardy (15-17).

The study of feeding practices in this particular period of life may contribute to the development of educative guidelines leading to an improvement on the feeding pattern, benefiting the infant population. This study was outlined on the main purpose of describing the prevalence of food intake of complementary foods by infants in their first year of life.

MATERIAL AND METHODS

A descriptive, cross-sectional study (*) was carried out. The study population comprised 175 children aged up to 12 months, attended to - either for medical care or vaccination - in two Health Centers of the state health network in the city of São Paulo, State of São Paulo, Brazil, from November 1997 to August 1998. The State Health Department indicated two health services: one health center, located at the central area, and the other, at the outskirts of the city.

After obtaining their informed consent, previously trained nursing attendants submitted mothers or responsible persons to a structured questionnaire containing closed-end questions about the child, data on the parents and on the child's feeding practice. The Committee on Ethical Research of the University of São Paulo School of Public Health granted this study authorization to be carried out.

Dietary survey

Information on feeding practices was gathered through a current status inquiry: a cross-sectional study is carried out in which each child is investigated in terms of his age and in relationship with the phenomenon of interest at the moment of the research. A list of foods customarily used during the first year of life is recorded in the questionnaire. Questions to each item of consumption might receive either a "yes" or "no" for response. The use of the current status approach is an alternative to avoid the bias of memory (18-22).

The utilization of the logistic regression model allows the use of a cross-sectional design to estimate the prevalence

of consumption of foods by the children in their first year of life, instead of carrying out a cohort study, of greater complexity and cost (20).

Study variables

The variables selected were those which might have influenced the children's feeding pattern. With the exception of age, which was kept continuous (in days), all the other independent variables were categorized (Table 1).

TABLE 1
Number and percentage of children according to independent variables. São Paulo, 1998

Variable	n	%
Gender		
Male	97	55.4
Female	78	44.6
Age (days)		
01—190	56	32.0
90—1180	56	32.0
180—1270	43	24.6
270—1365	20	11.4
Weight at birth		
Low weight < 2500 g	19	10.9
Adequate weight ≥ 2500 g	156	89.1
Mother's age		
Young mother ≤ 19 years	36	21.0
Adult mother > 19 years	139	79.0
Mother's schooling(*)		
Low schooling *	83	48.3
Non low schooling **	89	51.7
Father's schooling (**)		
Low schooling*	74	46.0
Non-low schooling **	88	54.0
Type of delivery		
Normal	89	51.1
Other (cesarean section or forceps)	85	49.9
Length of pregnancy		
Premature birth (< 38 weeks)	14	8.0
Full term pregnancy (38 weeks)	161	92.0
Nutritional status		
Low weight for age (≤ -2 z)	6	3.5
Normal (-2 < z < + 2)	160	91.4
High weight for age (≥ +2 z)	9	5.1

(*)3 individuals without information (**) 13 individuals without information
* up to 4th grade of elementary school ** complete elementary school or beyond

(*)This study is based on data of a research carried out by the Department of Nutrition of the University of São Paulo School of Public Health, financially supported by the FAPESP, aiming at checking on the prevalence of anemia among infants during their first year of life and its relationship with their feeding practice, in special with breastfeeding as well as with the infant growth and development.

The child's status concerning the consumption of a determinate food is expressed by Y, a variable that can take two values: Y= 1 or Y= 0, depending, respectively, on whether the child consumes or not the food. The dichotomic condition of this variable allows the use of a logistic regression model, in this particular case, in order to obtain the estimate of prevalence according to age (20).

This study searched out the consumption of the following foods: fruits (either mashed or in the form of juice); vegetables (potato; vegetables and/or greens); cereal and cereal products (rice; pasta; bread; and/or, cookies); any meat (bovine; of chicken or other poultry; liver; and/or, fish); bean (bean or bean broth – the water that the bean was coked); eggs (only yolk or the entire content) and just fish.

Statistical analysis

Descriptive analysis was accomplished by using central-tendency and dispersion measures. The associations of interest were examined by the Qui-square (χ^2) using the Yates' correction. The relationship between foods or food groups, which make up the independent variables, and the dependent variables was analyzed using univariated and non-conditional multiple logistic regression, by the *stepwise forward* technique. The diet pattern of introducing foods was examined on by the construction of a curve of prevalence of

consumption in function of age, using the logistic regression technique, expressed by the function:

$$\text{Prob (Y=1)} = P = \frac{1}{(1 + \exp - (\beta_0 + \beta_1x_1 + \dots + \beta_ix_i))}$$

where β_i are the coefficients of regression and x_i are the already mentioned independent variables.

This function allows to estimate the probability of a given child of the sample of having already started the consumption of a determinate food in function of age, measured in days, while controlling the other variables of interest (20).

The checking on the adjustment of regression models was achieved by means of the test of residue of Hosmer and Lemeshow (23).

RESULTS

The population's characteristics can be observed on Table 1.

There was no statistically significant association between the consumption of foods and the independent variables (Table 2).

TABLE 2
Distribution of number and percentage of children according to dependent and independent variables. São Paulo, 1998

		fruits			vegetables			Cereal and by products			Meat and/or eggs			beans			fish			eggs		
		n	%	p	n	%	p	n	%	p	n	%	p	n	%	p	n	%	p	n	%	p
Birth weight	Low birth	12	57.1		13	38.1		13	61.9		9	42.9		12	57.1		3	14.3		7	33.3	0.059
	Adequate Weight	79	51.3	0.787	66	42.9	0.158	62	40.3	0.100	46	29.9	0.341	51	33.1	0.056	15	9.7	0.795	22	14.3	
Type of delivery*	Normal	43	48.3		34	38.2		34	38.2		22	24.7		30	33.7		11	12.4		13	14.6	0.587
	other	48	51.7	0.355	45	52.9	0.072	41	48.2	0.273	33	38.8	0.066	33	38.8	0.586	7	8.2	0.520	16	18.8	
Length of pregnancy	premature	8	57.1		9	64.3		9	64.3		6	42.9		7	50		3	21.4		3	21.4	0.897
	full term	83	51.6	0.902	70	43.8	0.222	66	41	0.159	49	30.4	0.509	56	34.8	0.397	15	9.3	0.331	26	16.1	
Mother's age	young	19	52.8		17	47.2		16	44.4		10	27.8		14	38.9		5	13.9		5	13.9	0.815
	Adult	72	51.8	0.934	62	44.6	0.926	59	42.4	0.978	45	32.4	0.743	49	35.3	0.833	13	9.4	0.624	24	17.3	
Mother's schooling**	low	39	53.0		36	43.4		35	42.2		26	31.3		29	34.9		8	9.6		14	16.9	0.840
	no-low	43	51.7	0.983	42	47.2	0.727	39	43.8	0.949	28	31.5	0.884	33	37.1	0.894	10	11.2	0.936	15	16.9	
Father's schooling***	low	37	50.0		29	39.2		28	37.8		24	32.4		23	31.1		8	10.8		11	14.9	0.871
	no-low	46	52.3	0.896	42	47.7	0.351	39	44.3	0.500	26	29.5	0.822	32	36.4	0.589	8	9.1	0.919	15	17.0	
Nutritional Status (weight/age)	Low	5	83.3		3	50		4	66.7		3	50		2	33.3		2	33.3	0.165	3	50.0	0.073
	Normal	80	50.0	0.183	70	43.8	0.393	66	41.3	0.341	49	30.6	0.599	55	34.4	0.144	15	9.4		25	15.6	
	High	6	66.7		6	66.7		5	55.6		3	33.3		6	66.7		1	5.6		1	11.1	

n - number of children with the practice

% - percentage estimated in relation to the total of children of the category p - descriptive level of the test of association by the Qui-square, using the Yates' correction

Therefore, the option was to maintain within the model only the variable child's age. Results concerning the logistic regression analysis can be seen on Table 3. The β 's coefficient were used to build the Figure 1.

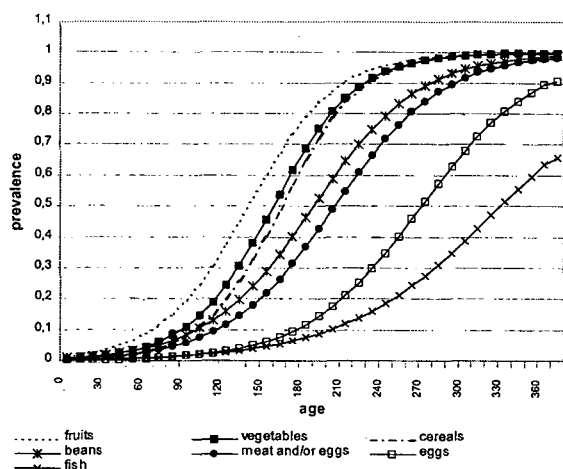
TABLE 3
Final models of the logistic regression analysis

Dependent variable	β constant (SE)*	β age (SE)	p**
fruits	- 4.1773 (0.633)	0.0306 (0.005)	< 0.001
vegetables	- 4.9683 (0.733)	0.0320 (0.005)	< 0.001
cereals	- 5.4695 (0.811)	0.0338 (0.0050)	< 0.001
meat	- 4.9684 (0.713)	0.0246 (0.004)	< 0.001
beans	- 4.6480 (0.666)	0.0250 (0.004)	< 0.001
fish	- 5.5553 (0.912)	0.0170 (0.004)	< 0.001
eggs	- 6.1447 (0.9360)	0.0230 (0.004)	< 0.001

* SE – standard error **p: descriptive level of Wald's test

Figure 1 shows the curves of prevalence of consumption estimated for the various foods.

FIGURE 1
Curves of prevalence of consumption of foods in two Health Centers. São Paulo, 1998



The prevalence of food consumption at 120, 180 and, 360 days can be seen on Table 4.

TABLE 4
Prevalence of consumption of foods at 120, 180 and, 360 days. São Paulo, 1988

Food	Prevalence of consumption (%)*		
	120 days	180 days	360 days
fruits	38	79	100
vegetables	24	69	100
cereals	20	65	100
beans	16	46	99
Meat and/or eggs	12	37	98
eggs	3	12	89
fish	3	8	64

* estimated on the basis of logistic regression models.

DISCUSSION

In this study, the first solid food complementary to milk (maternal and other) to appear in the infant diet was fruit, followed by vegetables, cereal, beans, meat and, in the last place, eggs and fish, in contradiction with the WHO's recommendations (8). The findings of this study disclosed a rather early incorporation of fruits, vegetables and cereal into the infant diet in the period of 4 to 6 months of age.

Similar results were observed by Tabai et al. (24), in the state of São Paulo rural zone: consumption of fruits was started between 2 and 4 months of age (43.6% of the infants); cereal and vegetables were introduced, respectively, for 38.2% and 36.4% of the infants between 4 and 6 months; as to meat, it was introduced between 6 and 12 months of age for 38.2% of the infants. However, these results differ from the ones observed by SOUZA (25), in a research carried out in 4 Health Centers in São Paulo city: the first food to be introduced into the infant diet, besides milk, was fruit, followed by meat, vegetables, yolk and beans.

Freeman et al (26), in a longitudinal, observational study on feeding practices of infants in Europe, verified that at age of 3, 4 and 5 months, 50%, 67% e 95% of infants were fed solid foods.

The estimates of prevalence of consumption observed in the present study were low for protein and iron containing foods, denoting a late incorporation of these foods into the infant diet; meat is consumed by half of the infants only by the seventh month on, reaching almost 100.0% at the end of the first year of life. Beans are consumed by 80.0% of the infants by the eighth month on and, like the meat, it is only at the end of the first year of life that it is consumed by practically all the infants. These findings are consistent with those obtained by Monteiro and Szarfarc (27), who verified that meat and bean appear in the diet of infants in the city of São Paulo, in a systematic way, only after the child is one

year old. In the same way, Tudisco et al. (28) verified that the consumption of cereal and starches is a common practice in four Brazilian capitals studied (São Luiz, Salvador, Rio de Janeiro and São Paulo), although observing low-frequency of consumption for meat and greens.

It is worth noticing how the early introduction of solid foods predominates in the diet of the population under study. These data are consistent with those observed in other studies. Prado et al. (29) found out that in the semiarid region of the State of Bahia, Brazil, the complementary foods are already introduced into the infant diet just in the first days of life, when the infants are given a pap made of manioc flour and bovine fat. Silva et al., (20) verified that, in Cuba, 94.7% of the infants were given juice at 120 days of life and 96.4% of them consumed meat at the age of 180 days. Hop et al. (30), in a longitudinal study designed to investigate the association between complementary feeding and physical growth in Vietnamese children verified a long term deterioration of physical growth in infants who received premature complementary feeding. Notzon (31) refers a tendency towards an early consumption of complementary feeding in the Caribbean countries, Central America, Africa and, some countries of Asia. However, these findings differ from those observed in Vancouver, Canada, by Williams et al. (32), where the introduction of foods occurs between the fourth and sixth months, in accordance with the guidelines recommended by the Committee on Nutrition of the Canadian Pediatric Society. The authors credit the fact to orientation provided by health professionals.

Greiner (33) alerts to the fact that mothers are rarely given orientation on how to achieve complementary feeding without substituting – not intentionally – large quantities of food and beverage for breastfeeding, leading to a decrease in the intake of mother's milk.

The fact that in this study the findings have disclosed fruit as the first food given to the infant to complement milk might be indicative that the complementary feeding is being carried out with low-energy density foods, such as fruit and vegetable gruel, provoking the substitution of foods of lesser nutritional value for milk, maternal or not. Such occurrence is in disagreement with the recommendations for Brazilian children aged less than 2 years (7), according to which fruit or vegetable juices and soups are not recommended in view of their low-energy density contents. The American Academy of Pediatrics (34) suggest that fruit juice is not a necessary part of an infant's diet.

The Ministério da Saúde (35), through the government regulation no. 34, of 01/13/98, established 0.7 kcal/g as the minimal energy-density permitted to ready-for-consumption industrialized products destined for replacing the main meal for children aged from birth to 3 years. It is worth noticing that, in this same government regulation, the age of 10 months

is established as the minimal age for using egg-white and the age of 9 months, for consuming cocoa bean, making no recommendations, however, as to the minimal age for consuming fish.

Cow milk, eggs, wheat and fish (36) are the foods most frequently blamed for causing allergic reactions. In this study, it was observed that eggs and fish were the last foods to be incorporated into the infant diet; even so, at the end of the first year of life, 10.0% of the children do not consume eggs and 34.0% of them do not consume fish.

Although there exist evidences of a relationship between feeding practices in the first year of life (in special, breastfeeding) with variables such as age, schooling and, income (37-38), in the present study such association was not observed for the consumption of complementary foods. Likewise, Brown et al. (39), in a study carried out in Peru, did not observe any association between socioeconomic variables and the feeding practice of children aged less than one year.

CONCLUSIONS AND RECOMMENDATIONS

In this study, the early introduction of complementary foods into the infant diet was made evident. The introduction of solid foods to complement breastfeeding is started with low-calorie density foods, in disagreement with the recommendations for Brazilian children. The first complementary solid food to be part of the infant diet was fruit, followed by vegetables, cereal, meat and/or eggs and, bean. Animal-protein-containing foods (meat and eggs) enter the infant diet much later. It was only at the end of the first year of life that the estimated consumption reached approximately 100.0%.

Although just limited to the population under study, the results of this paper make evident the need for carrying out programmatic actions in health education in order to provide orientation on the introduction of complementary feeding for suckling infants, in an adequate way, with high-energy density and high-nutrient foods after the sixth month of life. Concomitantly, exclusive breastfeeding should be encouraged up to this age and mothers should receive incentive to continuing breastfeeding when other foods are introduced into the infant diet. This methodology allows to built curves of estimated intake of food in the first year, using a cross-sectional study, and these figures can help health professionals to easily identify problem situations in the community level.

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