

## THE ASSESSMENT OF NUTRITIONAL VALUES OF JARRED BABY FOODS SOLD IN SUPERMARKET IN TURKEY ACCORDING TO FOOD LABEL

Esra Tunçer<sup>1\*</sup>, Aylin Bayindir Gümüş<sup>1</sup>, Alev Keser<sup>1</sup>

<sup>1</sup>Faculty of Health Sciences, Ankara University, Fatih Street, 197/A, 06290, Ankara, Turkey

\*e-mail: dytesra17@gmail.com

### Abstract

World Health Organization recommends exclusive breastfeeding up to 6 months of life. After this period, the energy and nutrients requirements of the infants are provided by complementary feeding in addition to the breast milk. This study was aimed to evaluate the nutrients profile of the jarred baby food according to Turkish Food Codex Labeling Directive.

The study used 54 jarred baby foods from two hypermarkets with high sale capacities in Ankara/Turkey to analyze price information and their contents of energy and some nutrients based on label information. The products were categorized two groups (number of cereal based products 25; number of non-cereal based products 29). Data analysis was performed in Statistical Package for the Social Sciences (SPSS) for Windows.

Most of the products (64.8%) were for babies'  $\geq 6$  months and 25.9% were for  $\geq 4$  months babies. The large of them (87%) did not contained added sugar. There was no statistically significant difference between the products in terms of the price/energy/dietary fiber/vitamin C ( $p > 0.05$ ). The protein, total fat and saturated fatty acids of the cereal-based products was higher than the non-cereal based products ( $p < 0.05$ ). The carbohydrates and sugar of the cereal based products were lower ( $p < 0.05$ ). Additionally, 55.6% of jarred baby foods was organic. The prices of the organic products [median: 0.85 euros/100 g] was higher than the conventional products [median: 0.44 euros/100 g] ( $p < 0.05$ ). When the products were evaluated according the health codes declared by the Turkish Food Codex Labeling Directive, the distribution of the products had as follows: 96.3% normal energy, 100% low-fat and low-saturated fat, 95.3% low dietary fiber, 100% low sodium, 14.8% protein source.

These infant foods, which are easy to access, are not as miraculous as expected. The majority of them are

grain-based and not protein source. It is necessary to make investigations about the contents of the jarred baby food and to raise the awareness of the consumers especially mothers.

**Key words:** Jarred baby food, Complementary feeding, Organic baby food, The label of baby food.

### 1. Introduction

Adequate and balanced nutrition is important in every stage of life, especially in infancy period, to sustain lifelong health and wellbeing. World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) suggest the exclusive breastfeeding for 6 months (180 days) to provide optimal infant feeding [1]. At the first six months of life, exclusively breastfeeding supplies to achieve optimal growth, development and health. Breast milk is the ideal food for infants which provides that babies get adequate nutrition. Additionally, breast milk contains antibodies so it helps protect infants from common childhood illnesses such as pneumonia and diarrhea [2].

After exclusive breastfeeding period, the energy and nutrients requirements of the infants are provided by complementary feeding in addition to the breast milk. Complementary feeding is defined by WHO as the process starting when only breastfeeding is no longer enough to supply the nutrients requirements of infants, and therefore other foods are needed, along with breastfeeding, after 6 month. Even though breastfeeding may continue for up to 2 years, the target age range for complementary feeding is 6 - 23 months [3].

Complementary foods should be timely, adequate, safe and appropriate. In order to be timely, complementary feeding should begin on the period of increasing

energy and nutrient requirements during feeding on exclusively or partially breast milk. Adequate complementary feeding means that the complementary foods should be met the nutritional requirements such as energy, protein, and other nutrients of the growing infants. It should be safe, meaning that the foods should be prepared hygienically and served under suitable conditions, in accordance with the rules of cleaning. The appropriate complementary feeding should be planned for by taking into consideration following: the age, appetite, hunger, satiety status of the child and food texture (such as finely chopped or mashed foods), feeding intervals [4, 5].

Complementary foods may be either self-prepared or bought as ready-to-eat commercial products. Nowadays, the consumption of packaged and ready-to-eat foods are becoming widespread in nutrition of children too, as in adults. There are several commercial complementary foods available such as: fruit purees, vegetable purees, meat purees, and mixtures with cereals. Furthermore, jarred baby foods are increasing day by day in markets. Despite the increase in jarred baby food, the number of researches about them is limited. We also have limited knowledge about the role of these foods in complementary feeding, the proportion of meeting nutritional requirements of babies and how much they should be used.

This study was aimed to evaluate the nutrients profile of the jarred baby food according to Turkish Food Codex Labeling Directive.

## 2. Materials and methods

### 2.1 Place, time and sampling

This study included jarred baby food that may be purchased in two supermarkets with located with high sale capacities in Ankara/Turkey between February 2019 and March 2019. All products in the "jarred baby food" of the markets were included. The data were collected by the researchers by taking the photos of the products on supermarkets.

**Table 1. Energy and nutrient contents of jarred baby foods (100 g)**

Parameters	Number (n) / Percentage (%)	$\bar{X} \pm SD$	Min-Max
Energy (kcal)	54 (100.0)	66.6 $\pm$ 14.98	30 - 107.5
Total fat (g)	54 (100.0)	0.7 $\pm$ 0.82	0.1 - 2.8
Saturated fat (g)	49 (90.7)	0.2 $\pm$ 0.35	0 - 1.3
Carbohydrate (g)	54 (100.0)	13.4 $\pm$ 3.73	4.7 - 18.9
Sugar (g)	49 (90.7)	8.2 $\pm$ 3.71	1.3 - 15
Fiber (g)	43 (79.6)	1.6 $\pm$ 0.76	0.1 - 3.2
Protein (g)	54 (100.0)	1.2 $\pm$ 1.10	0.1 - 4.5
Salt (g)*	22 (40.7)	0.1 $\pm$ 0.06	0 - 0.3
Sodium (g)*	42 (77.8)	0.0 $\pm$ 0.02	0 - 0.1
Vitamin C (mg)	31 (57.4)	21.6 $\pm$ 5.06	10 - 30
Calcium (mg)	8 (14.8)	76.2 $\pm$ 10.33	64 - 96

Legend:  $\bar{X}$  : mean, sd: standard deviation. On 7 products salt and sodium values were unclear, they were just given as upper values (< 0.05 g for salt, < 0.02 g for sodium).

### 2.2 Selection of materials and study design

54 jarred baby foods from 4 different brands were included in the study. The energy and nutrient contents of were examined Also, the contents of: energy (kcal), total fat (g), saturated fat (g), monounsaturated fatty acid (g), polyunsaturated fatty acid (g), linolenic acid (g), carbohydrate (g), sugar (g), dietary fiber (g), protein (g), salt (g), sodium (g), vitamin C (mg), calcium (mg),  $\beta$  carotene (mg), vitamin A (mcg), vitamin B<sub>1</sub> (mg) and iodine (mcg) per 100 g of the products based on label information were recorded for analysis. This information is not available in all products and is indicated in the tables. Nutritional contents of the products were evaluated according the health codes declared by the Turkish Food Codex Labeling Directive.

In addition to the nutritional contents of the products, the recommended month of consumption, package weight, whether organic or not, whether it is cereal-based, whether it contains additional sugar and price information have been also recorded.

### 2.3 Statistical analysis

Data analysis was performed via Statistical package for the social sciences (SPSS) 15 for Windows package program. Distribution of quantitative data were given with tables of number (n)/percentage (%). Mean, standard deviation (SD), median, interquartile range (IQR) and range values were given as descriptive statistics. The Fisher's exact chi-square test was used to determine whether there was a significant difference between the frequencies. If the data was not normally distributed, Mann-Whitney U test were used to compare the medians between two independent groups. Statistical significance was defined as  $p < 0.05$ .

## 3. Results and Discussion

### 3.1 Results

The energy and nutrient contents of these foods are given in Table 1.

All of the products included in the study had energy, total fat, carbohydrate, and protein values on food labels. There were information of saturated fatty acid, sugar, dietary fiber, sodium and salt respectively 90.7%, 90.7%, 79.6%, 77.8% and 40.7% of the products. Vitamin C (57.4%) was the most common micronutrient in the label of products (Table 1).

It has been declared that the majority of the products (64.8%) were suitable for babies aged 6 months or more. The recommended from 4 and 5 months of age were usually based on fruits and vegetables (Table 2).

Package weights of the products were not standardized. It varied between 120 and 220 g and the mean of the products weight  $136.6 \pm 28.89$  grams. 55.6% of them were organic, 46.3% of them were grain based and only 13% contained added sugar. Price for 100 g was between 0.37 - 1.14 euros (2.45 - 7.45 Turkish Liras).

In the Table 3 are shown energy, nutrients and price of jarred baby foods according to the claim whether they are organic and cereal based (Table 3).

According to whether the jarred baby foods were organic, there was no difference in energy and nutrient

**Table 2. Characteristic of jarred baby foods**

Parameters		Number (n)	Percentage (%)
Recommended month of consumption	4+	14	25.9
	5+	2	3.7
	6+	35	64.8
	8+	1	1.9
	10+	1	1.9
	12+	1	1.8
Package weight (g)	120	10	18.5
	125	35	64.8
	190	2	3.7
	200	6	11.1
	220	1	1.9
	$\bar{X} \pm SD$ (Min-Max)	$136.6 \pm 28.89$ (120 - 220)	
Organic Label	Yes	30	55.6
	No	24	44.4
Cereal-based	Yes	25	46.3
	No	29	53.7
Additional sugar	Yes	7	13.0
	No	47	87.0
Price (100 g) $\bar{X} \pm SD$ (Min-Max)	Turkish Lira	$4.7 \pm 1.59$ (2.45 - 7.45)	
	Euro	$0.72 \pm 0.24$ (0.37 - 1.14)	

**Table 3. Energy, nutrients and price according to whether the jarred baby foods are organic and cereal based (100 g)**

Parameters	Organic	Non organic	p*	Cereal-based	Non cereal-based	p*
	Median (IQR)	Median (IQR)		Median (IQR)	Median (IQR)	
Energy (kcal)	65 (13.75)	69.7 (26)	0.233	65 (30)	67 (14.24)	0.310
Total fat (g)	0.2 (1.4)	0.2 (0.98)	0.809	1.1 (1.7)	0.1 (0.1)	<b>0.000</b>
Carbohydrate (g)	14.4 (4.95)	14.9 (4.5)	0.284	14 (7.6)	15.5 (4.5)	<b>0.019</b>
Sugar (g)	9.1 (3.8)	8.9 (7.6)	0.887	4.3 (5.3)	11 (2.5)	<b>0.000</b>
Fiber (g)	1.3 (0.9)	1.5 (1)	0.220	1.3 (1.47)	1.7 (0.9)	0.845
Protein (g)	0.7 (0.75)	0.8 (2.08)	0.373	2.2 (2.07)	0.5 (0.36)	<b>0.000</b>
Salt (g)**	-	-	-	0.07 (0.05)	0.02 (0.01)	<b>0.006</b>
Sodium (g)**	0.02 (0.02)	0.01 (0.02)	0.336	0.02 (0.03)	0.01 (0.01)	<b>0.001</b>
Vitamin C (mg)	25 (8.75)	20 (10)	0.060	20 (5)	20 (5)	0.786
Price (Turkish Lira)	5.3 (1)	2.8 (2.33)	<b>0.000</b>	5 (3.23)	5.2 (1.95)	0.381
Price (Euro)	0.8 (0.15)	0.4 (0.36)	<b>0.000</b>	0.8 (0.5)	0.8 (0.29)	0.381

Legend: Mann-Whitney U test was used. \*\*Products with unclear values for salt and sodium were not included in the analysis.

**Table 4. Evaluation of energy and nutrient contents of jarred baby foods according to the Turkish Food Codex Labeling Directive (100 g)**

Parameters		Organic	Non organic	p*	Cereal-based	Non cereal-based%	p*	Total
		Number (n)/ Percentage (%)	Number (n)/ Percentage (%)		Number (n)/ Percentage (%)	Number (n)/ Percentage (%)		Number (n)/ Percentage (%)
<b>Energy (kcal)</b>	Low	2 (6.7)	-	0.497	2 (8)	-	0.210	2 (3.7)
	Normal	28 (93.3)	24 (100)		23 (92)	29 (100)		52 (96.3)
<b>Total fat (g)</b>	Low	30 (100)	24 (100)	-	25 (100)	29 (100)	-	54 (100)
	Normal	-	-		-	-		-
<b>Saturated fat (g)**</b>	Low	29 (100)	20 (100)	-	23 (100)	26 (100)	-	49 (100)
	Normal	-	-		-	-		-
<b>Dietary Fiber (g)**</b>	Source	2 (8.3)	-	0.495	1 (4.5)	1 (4.8)	1.000	2 (4.7)
	Not source	22 (91.7)	19 (100)		21 (95.5)	20 (95.2)		41 (95.3)
<b>Protein (g)</b>	Source	3 (10)	5 (20.8)	0.443	8 (32)	-	<b>0.001</b>	8 (14.8)
	Not source	27 (90)	19 (79.2)		17 (68)	29 (100)		46 (85.2)

Legend: \*Fisher's Exact Chi-Square test and Mann-Whitney U test were used, \*\*Nutrients that not in the label information were not taken into percentage.

contents. The prices of the organic products were found to be statistically higher than those not organic ( $p = 0.000$ ).

Differences were determined in cereal based and non-cereal products. In cereal-based products, while total fat, protein, salt and sodium were higher; carbohydrates and sugar were lower than non-cereal-based products (respectively  $p = 0.000$ ,  $p = 0.000$ ,  $p = 0.001$ ,  $p = 0.000$ ).

When the products were evaluated according the health codes declared by the Turkish Food Codex Labeling Directive, all products contained low total fat and saturated fat (Table 4).

96.3% of the products had normal energy and 95.3% and 85.2% respectively were not source of dietary fiber and protein. The percentage of cereal-based products with protein source was statistically significantly higher than non-cereal-based products ( $p = 0.001$ ).

### 3.2 Discussion

There are concerns about that food systems and marketing have adversely affecting population nutrition and health. Such concerns especially apply to infants and children feeding, because they are a vulnerable group, their nutrition and health may affect urgently. Additionally, the future eating habits and adult chronic disease risk are formed in infancy and childhood periods [6]. Today, the prevalence of packaged and ready-to-eat foods have increased and these products are available and reachable. The packaged foods may be beneficial for making life easier. For example, in a study which examined jarred baby food purchasing habits among mothers of infants in Hungary was found that travelling and following this the lack of time was the most popular reasons for purchasing jarred baby foods [7]. The contents of the packaged products are

important. In this context, the aim of this study was to evaluated the nutrients profile of the jarred baby food.

In this study, the majority of the products (64.8%) had a logo of "6+ months" on the labels. However, 25.9% of the products had a logo of "4+ months", and 3.7% of the products had a logo of "5+ months" on the labels. According to WHO Scientific and Technical Advisory Group (2017), foods for infants and young children should support optimal feeding so products should not be promoted as appropriate before 6 months [8]. In this context, it would be beneficial to update the label information of the products. Consumers should be informed about exclusive breastfeeding for 6 months through food label and misperception should not be created like these foods are superior to breast milk. In addition, it should not be ignored that the products with "4+ months" and "5+ months" logos may be used for infants who cannot consume breast milk and should start early complementary feeding for some reason (such as maternal or infant diseases). Likewise, the reason for writing the 4+ or 5+ months should also be indicated under these logos.

Nutritional component of jarred baby foods is quite important. The intakes of high dietary sugar may be related to adverse health outcomes such as: excess weight gain, dental problems, type 2 diabetes, and cardiovascular diseases. Furthermore, added sugar itself does not provide essential nutrients. Therefore, consumption of high added sugar may reduce diet nutritional quality [9]. In a study conducted in Germany, in infancy, higher commercial complementary food consumption was found to be associated with higher added sugar intake. In addition, the higher consumption of commercial complementary foods in infancy was found to be prospectively related to higher added sugar intakes in pre-school and primary school age [10]. In this study was determined that 13% of the jarred

baby foods contained added sugar. To not including of added sugar in commercial complementary products may be beneficial for the health of future generations.

There are various jarred foods for the babies in the market as classified the organic-non organic, cereal based-non cereal based or added sugar-non added sugar. However complementary foods have categorized as cereal-based and non-cereal-based products according to Turkish Food Codex, the notice of complementary foods for infants and young children [11]. Therefore, in this study this classification was used. In this study was found that, in the cereal-based products, the contents of total fat and protein were higher but the contents of carbohydrates and sugar were lower than non-cereal-based products (Table 3). The cereal-based products have also contented milk and meat, while non cereal based have included vegetables and fruit puree. Therefore, this result may be considered as normal.

When the products were evaluated according the health codes declared by the Turkish Food Codex Labeling Directive, the distribution of the products had as follows: 96.3% normal energy, 100% low-fat and low-saturated fat, 95.3% low dietary fiber, 14.8% protein source, and 4.7% dietary fiber source (Table 4). These products may be called "good" according to energy and fat content. However, the improvement of protein and dietary fiber contents of the jarred baby foods will be advantageous for health.

In this study, the organic and non-organic jarred baby foods were similar in terms of nutrient contents, but the organic products were higher price (Table 3). Nowadays, the consumption of organic products is drawn attention. In Turkey, in a study which to evaluated mother's and pregnant's organic food purchasing behaviours, was found that 40.1% of the participants purchase organic baby food products [12].

The limitation of this study was that babies who consume jarred baby foods had not known other food consumption during the day. Because it will be better to assess the babies' total nutrient intake to see whether or not the jarred baby foods meet the babies' daily nutrient requirement. Future research in this regard may be useful for improving the nutrients contents of jarred baby foods. The comparing the nutrients contents of home-made complementary foods and commercial complementary products is also future research topic.

#### 4. Conclusions

- The majority of the jarred baby foods are cereal-based and not protein source.
- Dietary fiber and protein contents of the commercial jarred baby foods should be improved, such that

especially the protein is essential for the growth and development of infant.

- At the first six months of life, exclusively breastfeeding should supported. Then, the energy and nutrients requirements of the infants should be provided by complementary feeding in addition to the breast milk.
- Complementary foods should be timely, adequate, safe and appropriate. It is necessary to make investigations about the contents of the jarred baby food and to raise the awareness of the consumers especially mothers.

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