STUDY ON THE CHEMICAL COMPOSITION OF SOME BABY-FOOD AND JUICE PRODUCTS FOR CHILDREN

STUDIU ASUPRA COMPOZIȚIEI CHIMICE A UNOR PRODUSE DE TIP BABY-FOOD ŞI SUCURI DESTINATE COPIILOR

EPERJESSY Diana Beatrice[1], TROFIN Alina[2]*, TRINCĂ Lucia Carmen[2], UNGUREANU Elena[2], SANDU Tatiana[2]

*Corresponding author e-mail: alina.trofin@gmail.com

Abstract. *Blended food or baby-food products marketed for children contain a source of protein, often meat, or can be made entirely from cereals, fruit blends and vegetables. These products must be appropriate from the point of view of both nutritional and safety. Fruit or vegetable juices are recommended as a good source of vitamins and as an additional source of water for healthy infants and young children. With all their benefits, the addition of sugar from the marketed products should be carefully controlled so as not to lead to obesity or metabolic disorder. This paper includes the determination of the content of ions present in three commercially available juices and three types of baby-food from fruits, vegetables and meat.*

Key words: baby-food, juice, fruits, vegetables

Rezumat. *Hrana pasată sau produsele de tip baby-food comercializate pentru copii, conțin în compoziția lor o sursă de proteine, de multe ori carnea, sau pot fi în totalitate din cereale, amestecuri de fructe dar şi legume. Aceste produse trebuie să corespundă din punct de vedere al siguranței dar şi din cel nutritiv. Sucurile de fructe sau legume sunt recomandate ca fiind o bună sursă de vitamine şi o sursă suplimentară de apă pentru sugarii sănătoşi şi copiii mici. Cu toate beneficiile acestora, adausul de zahăr din produsele comercializate trebuie atent controlat pentru a nu conduce la obezitate sau dereglări metabolice. Lucrarea de față include determinarea conținutului unor ioni prezenți în trei sucuri comercializate şi în trei tipuri de hrană pasată din fructe, legume şi carne.*

Cuvinte cheie: hrană pasată, sucuri, fructe, legume

INTRODUCTION

In the first two years of life of the child, optimal nutrition promotes healthy growth and improves cognitive development. It also reduces the risk of becoming overweight or obese and offers the possibility of developing later in life.

For blended food products intended for infants and young children, the following must be taken into account when meat (beef, poultry, fish and organs) is used as a source of protein:

[1]"Saint Mary" Children's Clinical Emergency Hospital Iaşi, Romania
[2]University of Agricultural Sciences and Veterinary Medicine from Iaşi, Romania

- each source of meat protein (beef, poultry, fish, organs) must be greater than 25% of the total protein content;

- the protein source must not represent less than 40% of the weight of the product;

- the protein level in these sources must be greater than or equal to 1,7 g / 100 kJ (7 g / 100 kcal). (Banu, 2010)

Fruit-based baby-food is an important source of energy, basic nutrients, fiber, vitamins, minerals, polyphenols and other sources of antioxidants provided by the fruit in the composition. Along with fruit or vegetable pure, cereals of different type may be included in the mix for their high fiber content. (Mongeau *et.al*, 2001)

Fruit juices are accounted for about 50% of all fruits consumed by children aged between 2 and 18 and one third of all fruits and vegetables consumed by preschool children. Soft drinks are those products which are made from flavored concentrates, fruit or vegetable juices, fruit syrups, flavoring substances (natural or synthetic), flat or mineral water, vitamins and other substances, with or without added carbon dioxide and sweeteners (sugar, saccharin, glucose or other).

The carbohydrate concentration ranges from 11 grams (0.4 kcal / mL) to > 16 grams% (0.64 kcal / mL). The juice contains a small amount of protein and minerals. Some of the juices naturally contain a certain amount of potassium, vitamin A and vitamin C. (Dias, 2012)

Fruits and vegetables are often featured in names of commercial baby foods. Fruits are more common than vegetables in names of the 329 baby food taken into a study made in Spain.

The six most common fruits and vegetables in the names were all relatively sweet: apple, banana, tomato, mango, carrot and sweet potato. Their percentage in the foods ranged from a median of 94% for sweet-spoonable to 13% for dry-savory products. Fruit juice was added to 18% of products. (Garcia *et al*, 2016)

This paper aims to analyze the acidity and some of the main ions content in three commercial baby food products made from mixed fruits, mixed vegetables and chicken and three soft drinks based on concentrated juice (oranges; raspberry and apple; apple, carrot and orange).

MATERIAL AND METHOD

The following soft drink brands were analyzed, with the characteristics offered by the producers:

P 1 – Orange soft drink from Tymbark;

P 2 - Raspberry and apple soft drink from Figo Kids;

P 3 – Carrot and fruit (apple and orange) juice with honey from Tedi;

P 4 – Fruit blended baby food (orange, peach, pineapple) from Hipp;

P 5 – Vegetables mixed baby food (carrot, potato, peas-cauliflower) from Hipp;

P 6 – Baby food mixture with chicken meat from Hipp.

Fig. 1 Samples of juices and baby-food products taken into analysis

The following physical and chemical parameters were tested: moisture and dry matter (by oven drying method at 105^{0}C), titratable acidity (volumetric method), nitrites content (Griess reagent colorimetric method and Spekol 1100), chloride content (Mohr method with silver nitrate reagent), sulphite content (iodometry titration method) and phosphate content (sulphuric molybdenum reagent colorimetric method and Spekol 1100). In order to determine the considered parameters, especially the ions content, the juices were filtered and the baby-food samples were extracted with distilled water and also filtered.

RESULTS AND DISCUSSIONS

Moisture and dry matter were initially determined in order to asses the water / mineral and nutrients ratio intake of the considered products (fig. 2).

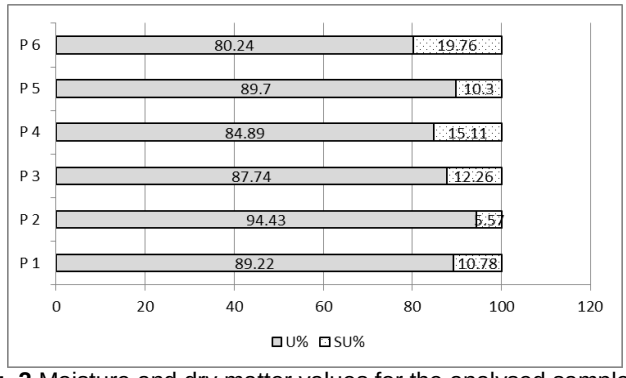
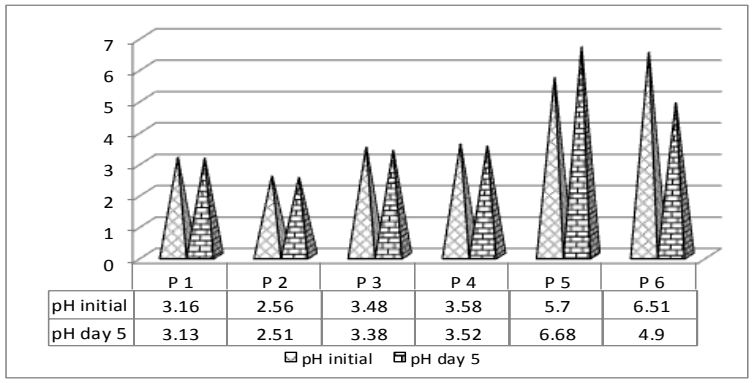


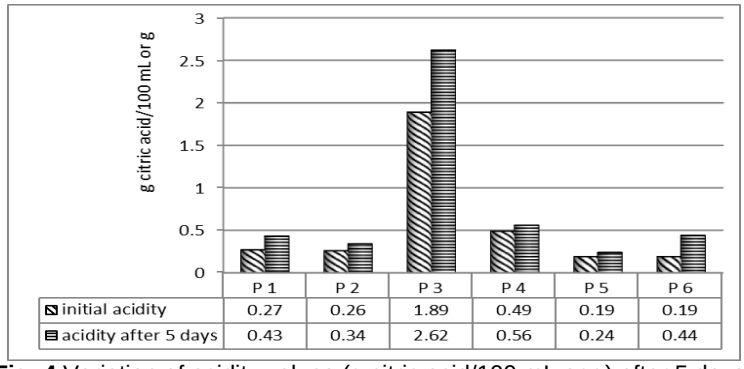
Fig. 2 Moisture and dry matter values for the analysed samples

The pH values were determined when the jars and packeges were open and again after five days in the refrigerator. In correlation to the determined pH values, the acidity was masured for each sample, initially and after five days, expressed in g citric acid/100 mL or g of sample. Recorded data for these two parameters are shown in figures 3 and 4.



	P 1	P 2	P 3	P 4	P 5	P 6
pH initial	3.16	2.56	3.48	3.58	5.7	6.51
pH day 5	3.13	2.51	3.38	3.52	6.68	4.9

Fig. 3 Variation of pH-values during 5 days storage in refrigeration conditions



	P 1	P 2	P 3	P 4	P 5	P 6
initial acidity	0.27	0.26	1.89	0.49	0.19	0.19
acidity after 5 days	0.43	0.34	2.62	0.56	0.24	0.44

Fig. 4 Variation of acidity values (g citric acid/100 mL or g) after 5 days

Chloride ions come from the raw material and from the addition of salt or other preservatives. From the analysis of the obtained results it was found that the sample P3 (carrot juice and fruit - apple + orange - with added honey) recorded the highest value for chloride ion content of 0.3748 g Cl - per 100 mL of sample (fig. 5).

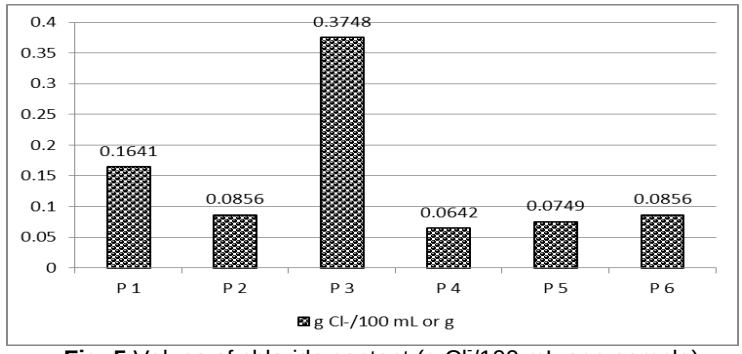


Fig. 5 Values of chloride content (g Cl^-/100 mL or g sample)

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) approved in 2002 an acceptable daily intake (ADI) of 0-3,7 mg / kg bodyweight for nitrates and of 0-0,07 mg / kg for nitrites. JECFA also states that ADI does not apply to infants under the age of 3 months (EFSA, 2008). The obtained values are presented in figure 6.

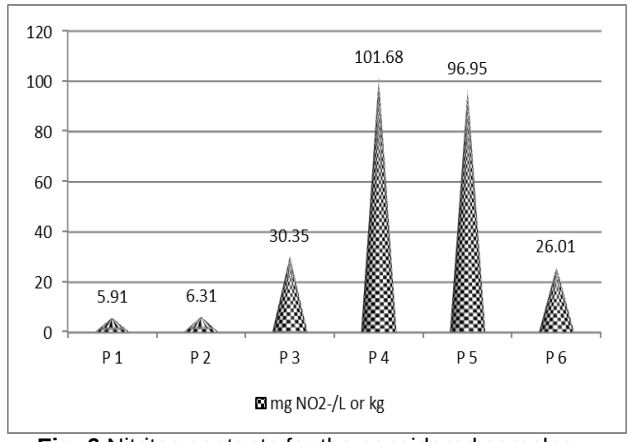


Fig. 6 Nitrites contents for the considered samples

Usually, sulphites are used as preservatives for beverages, but in the case of chicken based baby-food, the sulphite content was higher, with a value of 116.88 mg in 100 grams sample (fig. 7).

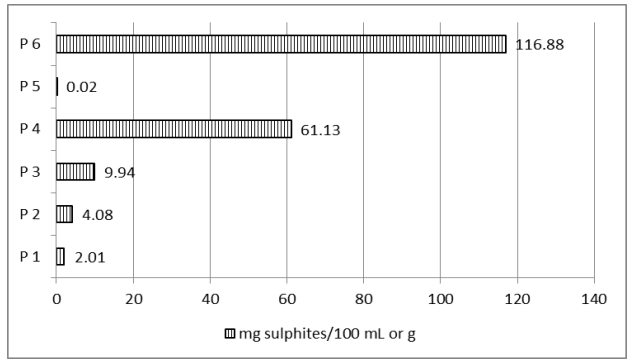


Fig. 7 Sulphites content expressed as mg/100 mL or g sample

For chicken based baby-food, with 40% meat, only phosphate free ions in the deproteinized extract were dosed, therefore the P4 and P5 samples from vegetables and fruit have higher values. Knowing that the maximum allowed level for phosphate ion in food for children between 1 and 13 years is 3000 - 4000 mg per day, it is observed that the samples fall within the tolerable limits, considering only the free phosphate ions in the extract for sample P6 (fig. 8).

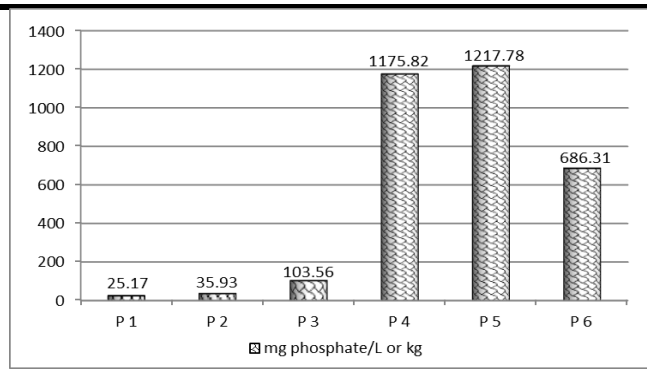


Fig. 8 Phosphate content expressed as g phosphate ion/kg sample

CONCLUSIONS

1. In terms of pH values and variation, the vegetables based and the chicken-based blended baby-food registered the highest values and a modification of 1, respectively 1.4 pH units after five days;

2. From the analysed juices, the highest free acids content, both initial and after 5 days, registered for carrot, apple and orange juice with honey from Tedi;

3. The same product showed highest values for chloride ion, as well, but a daily portion could not exceed the limit, considering a total allowed intake of 2 g of salt (1.21 g Cl^-) a day for children aged between 1 - 3 years;

4. The fruit and vegetable blended baby-food (P4 and P5) presented higher amounts of nitrites, most likely from the processed raw material and the fertilizers used in their culture;

6. The vegetable-based baby-food P5 presented a very low content in sulphite ions, but the highest amount of phosphate; in rest, the blended food products presented higher values for these ions than the juices, as normal.

REFERENCES

1. **Banu C. et al., 2010** - *Alimente funcționale, suplimente alimentare şi plante medicinale,* Editura ASAB, Bucureşti;

2. Dias J.S., 2012 - *Nutritional Quality and Health Benefits of Vegetables: A Review*, Food and Nutrition Sciences Vol. 3, no.10, pp. 21

3. **European Food Safety Authority, 2008** - *Nitrate in vegetables - Scientific Opinion of the Panel on Contaminants in the Food chain,* EFSA Journal, 689, pp.1-7;

4. **Garcia AL, McLean K, Wright CM, 2016** - *Types of fruits and vegetables used in commercial baby foods and their contribution to sugar content*, Matern Child Nutr. Vol.12 issue 4, pp.838-847;

5. Mongeau R., Brassard R., Deeks J. et al., 2001 - *Comparison of Dietary Fiber Contents of Selected Baby Foods from Two Major Brands in Canada Using Three Methods* Journal of Agricultural and Food Chemistry 49(8), pp 3782-3786.