

ON THE USAGE OF POTASSIUM SORBATE (E202) IN DIFFERENT SORTS OF MARGARINE AND ESTIMATION OF ITS POTENTIAL DAILY INTAKE

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Abstract

Sorbic acid and its sorbates are food preservatives widely used, in manufacturing more than 80 food products categories, according to Codex Alimentarius. Their role is to prevent the development in food of dangerous microorganisms, especially from moulds and yeasts categories, as well as to preserve certain sensorial traits of the food.

The aim of this paper was to identify and quantify the potassium sorbate (E202) presence in certain commercially available margarines and to estimate the hypothetical daily dietary intake in three consumers' categories (adult women and men and children), in comparison with the maximal admitted levels specified by the en-force regulations.

Thus, the potassium sorbate inclusion rate reached 133-138 mg additive/100 g margarine, which represented 66-69% of the maximal inclusion threshold (200 mg E202/100 g margarine).

The intake levels were calculated at 0.440 – 0.460 mg potassium sorbate/kg body weight in women and children, respectively at 0.495 – 0.518 mg E202/kg body weight in men.

Such levels represented just 1.76-2.07 % of the maximal admitted daily intake in humans (25 mg potassium sorbate/kg body weight).

Key words: potassium sorbate, margarine, inclusion rate, daily dietary intake

INTRODUCTION

Many concerns raise among the modern consumers, which became more exigent to the quality of food, mainly to those potential direct or indirect risks that could threaten them though the daily intake of food improved by adding chemically synthetized ingredients (Hura C., 2008). The sorbates family (sorbic acid and its salts) play a significant role in the food industry, due to their properties involved in food sensorial properties preservation or in prolonging its shelf life (Banu et al., 2010).

They act efficiently against moulds and yeasts, while the action against bacteria is lower. However, at a pH below 6.5, sorbates could have a slight inhibitory effect against *Clostridium botulinum*. Their fungicide effect is significant, mostly on some mould species that are known as mycotoxins producers (Oşan A., 2010).

In certain food categories rich in fats, such as margarine, butter, mayonnaises, salad dressings, the sorbic acid and the sorbates inhibit the development of moulds, preventing thus the subsequent lipolysis and rancid alterations (Orănescu E., 2008).

In most of the cases, the sorbic acid and the sorbates are considered as non-harmful for humans, because most of their compounds are assimilated and metabolised successfully by the organism.

There were also reports of persons with accentuated sensibility and allergic reactions to foods containing a certain amount of sorbates (in their composition or on the surface). Mucosal membrane irritations and skin rash are the most known side effects of sorbates (A. M. Fărr, 2000).

Another negative effect of sorbates is that they drain out the B₁₂ vitamin available in the organism. Moreover, it was emphasised that calcium sorbate could have a pronounced mutagen actions, despite the fact that doses and conditions of usage were not specified in the studies reporting the undesirable effect (Orănescu E., 2008).

According to Gouget C. (2012), the sodium sorbate (one of the most used chemical preserving additives in food industry) could interact with the nitrates and could induce congenital malformations.

Other authors reported that using this sorbate could lead to severe illness chronic conditions, such as: asthma, atopic rash, rhinitis and digestive disorders (Mihai G., 2013).

MATERIAL AND METHOD

The aim of the research was to quantify the potassium sorbate used in producing five sorts of margarine commercially available (*Rama- M1*, *Becel – M2*, *Auchan- M3*, *Linco – M4*, *Delma – M5*) and to report this content to a hypothetical intake, through an estimation of consumers dietary patterns. Sorbic acid and its sorbates used in margarines were assessed through the spectrophotometric method (AOAC, 1990) using a VWR – UV6300PC double beam spectrophotometer.

The results were compared to the dosage admitted for inclusion in such food category (2000 mg potassium sorbate/kg of fat emulsions with more than 60% total lipids; 1000 mg potassium sorbate/kg of fat emulsions with at least 60% total lipids) (Codex Alimentarius, F.A.O., 2019). Starting from an estimated dietary daily consumption of margarine (20g in women, 30 g in men and 10 g in children), the daily intake quantity was obtained for each of the three category of consumers (adults, women of 60 kg body weight, men of 80 kg body weight and children of 30 kg body weight, as well).

RESULTS AND DISCUSSION

Potassium sorbate (E202) concentrations quantified in the five studied margarine sorts are presented in table 1.

There were not identified exceeding doses, in comparison with the maximal admitted inclusion limit, i.e. 200 mg sorbate/100 g product.

The first margarine sort (M1) had an average content of 132 ± 7.21 mg potassium sorbate/100 g, while in the second investigated sort (M2), a slight increase was detected, in comparison with the former one (134 ± 7.21 mg potassium sorbate/100 g).

The last three sorts (M3, M4, M5) presented also close values of potassium sorbate per 100 g product (M3= 138 ± 5.20 mg E202; M4= 137 ± 5.74 mg E202; M5= 135.50 ± 8.06 mg E202).

In comparison with the maximal allowed inclusion threshold (tab. 1), in M1 samples was calculated a 66% sorbate inclusion rate, therefore 34% less E-202 vs. the maximal possible dosage.

Table 1

Average values of the potassium sorbate contents in the five sorts of margarine

Analysed product	Analytical value (mg/100 g) Mean	Mean standard error	Variation coefficient v%	Legal Inclusion threshold (mg/100 g)	% vs. legal threshold
Margarine M1	133.00	± 7.21	17.28	200	66
Margarine M2	134.00	± 3.61	8.51	200	67
Margarine M3	138.00	± 5.20	11.91	200	69
Margarine M4	137.00	± 5.77	13.26	200	68.5
Margarine M4	135.50	± 8.06	18.82	200	67.75

In the second product (M2 margarine, the inclusion rate represented 67% of the maximal admitted one, 33% less than the standard; in M3 margarine, potassium sorbate reached 69% of the maximal allowed dosage (31% less); in M4 margarine, the analytical values revealed a 68.50% sorbate content out of the 200 mg/100 g maximal regulated threshold (31.5% less). In the last analysed sort (M5), the potassium sorbate level reached 67.75% of the maximal admitted one (32.25% less vs. the whole admitted potential inclusion level).

Data referring to the potassium sorbate hypothetical daily intake were derived from the estimated margarine portion to be consumed daily by the three categories of consumers (20 g in adult women, 30 g in adult men and 10 g in children) (table 2).

Table 2

Estimation of the potassium sorbate (E-202) daily intake (mg/kg body weight)
from the five sorts of margarine

Consumer category	Sort of margarine				
	M1	M2	M3	M4	M5
Maximal allowed intake	25	25	25	25	25
Adult woman, 60 kg body weight	0.440	0.447	0.460	0.457	0.451
<i>% of daily maximum allowed intake</i>	1.76	1.78	1.84	1.82	1.80
Adult man, 80 kg body weight	0.495	0.503	0.518	0.514	0.508
<i>% of daily maximum allowed intake</i>	1.98	2.01	2.07	2.05	2.03
Child, 30 kg body weight	0.440	0.447	0.460	0.457	0.452
<i>% of daily maximum allowed intake</i>	1.76	1.79	1.84	0.82	1.81

In women having 60 kg body weight, the daily intake of potassium sorbate was estimated between 0.440 – 0.460 mg potassium sorbate/kg body weight, which represented 1.76-1.84% of the maximal admitted daily intake (25 mg potassium sorbate/kg body weight).

In men with an average body weight of 80 kg, the daily intake was calculated between 0.495 – 0.518 mg E-202, that corresponded to a dosage of 1.98 – 2.07 % of the maximal admitted daily intake.

In the last category, represented by children with an average weight of 30 kg, the values were similar to those identified in adult women (0.440 – 0.460 mg potassium sorbate), corresponding to a proportion of 1.76 – 1.84 % of the maximal dosage (25 mg potassium sorbate/kg body weight).

CONCLUSIONS

Potassium sorbate (E202) inclusion rate in the five commercially available margarine products was 31-34% lower than the maximal admitted level (200mg potassium sorbate/100 g product).

Estimation of the daily intake of E202 (mg/kg body weight) through the consumption of one margarine portion, in accordance with the consumer type (30 g in men, 20g in women and 10g in children), revealed values that represented 0.82-2.07% of the maximal intake dosage in humans (25mg E202/kg body weight)

Usage of potassium sorbate in this food product category is justified, hence it prevents the development of moulds that could lead to lipolysis and rancid degradations, knowing that the consumption of margarine is increasing (basing of financial affordability and practical reasons in domestic food preparation), despite the fact the product itself is not a healthy one.

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