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Monotoring of Sausage Product Adulteration in Armenia

D.A. Pipoyan*, M.B. Beglaryan, A.S. Hovhannisyan***, A.S. Abrahamyan******
Center for Ecological-Noosphere Studies of National Academy of Sciences
*david.pipoyan@cens.am, **meline.beglaryan@cens.am, ***astghik.hovhannisyan@cens.am, ****armen.abrahamyan@cens.am

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ABSTRACT

Taking into consideration the fact that very often producers decrease the cost of products through adulterations, particularly through the replacement of animal protein with plant ingredients, a study has been carried out, which is aimed at the detection and evaluation of adulterations observed in the market of sausage products. In all samples of sausage products studied in 2017, and in the majority of sausage products studied in 2018 soy protein allergen was determined, however, the relevant labeling was missing. The latter is not only a legislative, but also a public health issue.

Introduction

In recent years, sausage products have often been targets for fraud due to their high market value. Although different types of food frauds (adulteration, counterfeiting, substitution and deliberate mislabeling of products) occur for a variety of reasons, most often they are connected with financial profit achieved through adulteration (Abbas et al., 2018). One of the adulteration forms for economic gain is the addition of cheaper proteins in sausage products as undeclared ingredients. Vegetable protein, such as the cheap and readily available soy, is one of the most commonly used proteins for fraudulent substitution of animal protein (Ballin, 2010). This adulteration often occurs to cause unfair competition and is a potential health hazard for individuals (Asensio et al., 2008, Sentandreu et al., 2014).

In order to protect consumers' interests and public health, in addition to combating the growing problems of sausage adulteration, product's specificities have to be identified in an evidence-based manner. From this perspective, the authenticity and safety of sausage products are of primary importance to avoid unfair competition and assure consumer protection against fraudulent practices (Asensio et al., 2008, Iammario et al., 2017). This involves procedures capable of verifying that the product matches the label statements and that it conforms to the provisions of applicable laws and regulations (Abbas et al., 2018). Currently, Armenia is a member of Eurasian Customs Union and according to Technical Regulations (TR TS 022/2011, TR TS 034/2013), ingredients (including soy protein), the consumption of which may entail allergic reactions or are contraindicated in case of certain diseases, should be indicated in the food ingredient list irrespective of their quantity. Nevertheless, the previous investigations of 2017 showed that 18 types of sausages produced by 11 meat producing companies have contained allergen soy protein, without any declaration on the package of the product (Pipoyan et al., 2018). Therefore, this study aims to carry out the monitoring of adulteration of sausage products manufactured in Armenia.

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Materials and methods

Sampling of the sausages was done from Yerevan's markets in 2017 and 2018 according to GOST standard 9792-73 (GOST 9792-73). In total, 39 (with *E1/17-E18/17, N1/17-N14/17 and S1/17-S7/17* codes) and 36 (with *E1/18-E4/18, E6/18-E11/18, E14/18, E15/18, E17/18-E21/18, N1/18-N3/18, N6/18, N7/18, N10/18, N11/18, N15/18-N20/18, S1/18* and *S7/18-S10/18* codes) types of sausage products were investigated during 2017 and 2018, respectively. Sampled and investigated sausage products were produced by the "Bari Samaratsi" LLC, "Atenk" LLC, "Luma" LLC, "Bacon Product" LLC, "Natali Farm" LLC, "Elit Prod" LLC, "A. Bilian" LLC, "AR Delikates" LLC, "Ararat" P/C, Tsaritsino" LLC, "Marila" LLC, "Natfood" CJSC and "Bayazet 1" LLC.

Qualitative and quantitative measurements of soy protein in the sausage product samples were done by enzyme-linked

immunosorbent assay (ELISA) method and by using the R-biopharm RIDASCREEN®FAST Soya (Art. No. R7102) kit with 5 standard solutions containing 0-20 mg/kg soya protein. Quality assurance and quality control (QA/QC) on the analysis was implemented in accordance to Quality Assurance Certificate provided with the kit (Pipoyan et al., 2018).

Results and discussions

The 2017-2018 monitoring results for sausage products are summarized in Table.

Table. Soy protein in analyzed samples of sausage products

Code of the samples		Declared				Determined soy protein, mg/kg	
		Generally - plant protein		Soy protein			
		2017	2018	2017	2018	2017	2018
1	2	3	4	5	6	7	8
Sausage	E1	-	+	-	-	>20	>20
	E2	+	+	-	-	>20	>20
	E3	+	+	-	-	>20	>20
	E4	-	+	-	-	>20	>20
	E5	-	*	-	*	>20	*
	E6	-	-	-	-	>20	>20
	E7	-	-	-	-	>20	*9,98*
	E8	-	-	-	-	*17,42*	>20
	E9	-	-	-	-	>20	>20
	E10	-	-	-	-	*4,91*	***not detected***
	E11	-	-	-	-	>20	>20
	E12	-	*	-	*	>20	>20
	E13	-	-	-	-	*8,21*	>20
	E14	+	-	-	-	>20	>20
	E15	-*	+	-	-	>20	>20
	E16	-	*	-	*	>20	*
	E17	-	-*	-	-	>20	>20
	E18	-	+	-	-	>20	>20
	E19	*	+	*	-	*	>20
	E20	*	-	*	-	*	***not detected***
	E21	*	+	*	-	*	>20
Paris sausages	N1	+	+	-	-	>20	>20
	N2	-	+	-	-	>20	>20
	N3	+	+	-	-	>20	>20
	N4	-	*	-	*	>20	*
	N5	-	*	-	*	>20	*
	N6	+	+	-	-	>20	>20
	N7	+	+	-	-	>20	>20
	N8	-	*	-	*	12,4	*
	N9	+	*	-	*	>20	*
	N10	+	+	-	-	>20	
	N11	-	-	-	-	15,72	***not detected***
	N12	-	*	-	*	>20	*
	N13	+	*	-	*	>20	*
	N14	-	*	-	*	>20	*
	N15	*	-	*	-	*	***not detected***
	N16	*	-*	*	-	*	>20
	N17	*	-	*	-	*	>20
	N18	*	-	*	-	*	>20
	N19	*	-	*	-	*	>20
	N20	*	-	*	-	*	>20

Table Cont'd

1	2	3	4	5	6	7	8
Paris sausages	S1	+	+	-	-	>20	>20
	S2	-*	*	-	*	>20	*
	S3	-*	*	-	*	>20	*
	S4	-*	*	-	*	>20	*
	S5	-	*	-	*	>20	*
	S6	+	*	-	*	>20	*
	S7	+	+	-	-	>20	>20
	S8	*	+	*	-	*	>20
	S9	*	-	*	-	*	***not detected***
	S10	*	-	*	-	*	>20

Note: "-"- not declared, "+" - declared, "-*" - product label is missing, ">20" - the quantity higher than the equipment sensitivity, "*" - not studied in that year.

The obtained data for 2017 showed that a soy protein was detected in all 39 investigated samples. In contrast to this, the results obtained in 2018 showed, that only in 5 samples the soy protein was not detected. It should be stressed that for the majority of investigated samples soy protein was not declared. Instead, 20 samples with declared composition by the producer, were labeled only with general data (plant protein), without specifying the origin of the plant protein (Table).

Conclusion

The obtained data allows us to conclude that in all samples (100%) of sausage products studied in 2017, and in the majority of sausage products (86 %) studied in 2018, the soy protein was determined, however the relevant labeling was missing (Figure). The latter is not only a legislative, but also a public health issue.

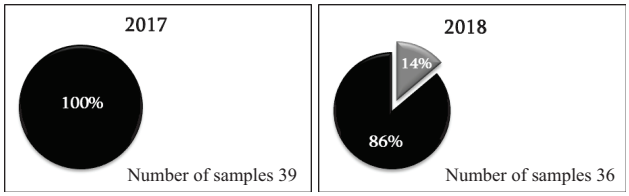

Figure. The percentage (%) of soy protein containing sausage products in 2017and 2018

Thus, it should be concluded that it is urgent for the authorities to control the adequacy of labeling and extend the scope of official monitoring plans, focused on overall assessment of the quality and safety of sausage products.

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