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Original research paper

MONITORING OF SODIUM CHLORIDE (SALT) CONTENT IN CHICKEN AND PORK HOT DOGS FROM SERBIAN MARKET

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ABSTRACT: Sodium chloride as the most used ingredient in meat products is one of the main contributors to sodium intake between consumers. Studies showed that excessive sodium intake is connected with many cardiovascular diseases. In this study 11 samples of chicken hot dogs and 10 samples of pork hot dogs purchased on Serbian retail network were examined for sodium, i.e. sodium chloride content. The sodium content in examined samples ranged between 6278 to 9131 mg/kg. These results were similar to sodium/sodium chloride content in meat products on European market. However, it is shown that possibility for its reduction and adaptation of regulatory authorities' recommendations is realistic.

Key words: *salt content, meat products, chicken hot dogs, pork hot dogs.*

INTRODUCTION

Sodium chloride (salt) is mostly used ingredient in meat processing industry due to numerous impacts on the safety and quality of meat products. Salt plays a great role in microbial stability by controlling the growth of foodborne pathogens and preventing spoilage. It enhances the perception of meat flavor, which is an important factor in the overall acceptability of meat products and gives the meat products unique taste that consumers associate with saltiness. Also, salt acts to enhance the textural properties of processed meat and it contributes to color, cohesiveness, water holding capacity and pH (Matthews and Strong, 2005; Desmond, 2006; Doyle and Kathleen, 2010; Vuković, 2012; Pretorius and Schönfeldt, 2018; Silva Haddada et al., 2018).

However, in the recent decades, technological innovation, urbanization and lifestyle habits lead to increasing consumption of processed foods containing high levels of salt (Doyle and Glass, 2010, Trikia et al., 2017). Nowdays, the most sodium chloride in the diet comes from processed foodstuffs (Ruusunen and Puolanne 2005; Doyle and Glass, 2010). Meat and meat products are the second largest contributor to dietary sodium (Na) intake, with approximately 21% of the Na daily intake (Matthews and Strong, 2005; Desmond, 2006). But, excessive intake of sodium has been associated with increased blood pressure (hypertension), one of the major risk factors for cardiovascular diseases such as coronary heart disease and stroke, as well as other health problems such as stomach cancer and renal diseases (WHO, 2010). Thus, many countries regulated total salt intake through reduction strategies for sodium content in processed foods (Inguglia et al., 2017).

With an increase of political, economic, health, and consumer awareness Finland, UK, EU, USA and a lot of other countries formed national strategies of reduction in salt consumption (Aaslyng et al., 2014). Also, Food Standards Agency (FSA), World Health Organization (WHO), European Food Safety Authority (EFSA) and other regulatory authorities pressure food industry to reduce salt levels in processed food and recommend a daily average consumption of <5–6 g of NaCl or < 2–2.4 g of Na (Desmond, 2006; EFSA, 2009; Matthews and Strong, 2005; WHO, 2012). Public Health England (PHE) has published Salt Reduction Targets for 2017 with average salt target (g salt or mg sodium per 100g) of 1.38g salt or 550mg sodium and maximum salt target of 1.7g salt or 680mg sodium for cooked sausages and sausage meat products.

Thus, the aim of this study was to monitor the salt content in hot dogs, one of the most abundant meat products in Serbia, in order to collect information needed for Serbian national strategy formation.

MATERIAL AND METHODS

Meat product samples

Commercial chicken and pork hot dogs produced by the most common meat processors were collected from the Serbian retail market during the year 2018. After collection, samples of chicken hot dogs from 11 and pork hot dogs from 10 meat processors were homogenized and stored at -18 °C until analysed. All determinations were made in three samples from each meat processors.

Sodium and salt determination

Sodium (mg/kg) was determined according to the international standards ISO 6869:2000 by using atomic absorption spectrometry. Salt content was estimated from the sodium according to Serbian regulation 19/2017 and 16/2018 (2017).

Statistical analyses

One way (ANOVA), Post-hoc (Duncan test) was performed using the software package Statistica 9.1 for Windows, Stat Soft, Tulsa, Oklahoma, USA, 2009. Differences were considered significant at $P < 0.05$.

RESULTS AND DISCUSSION

Mean values and standard deviations for sodium (mg/kg) and salt content (g/100g) in chicken and pork hot dogs from different Serbian meat processors are presented in Table 1 and Table 2.

Table 1. Sodium (mg/kg) and salt content (g/100g) in chicken hot dogs from different Serbian meat processors

	Chicken hot dogs										
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
Sodium (mg/kg)	8394^{f} ±2.5	8573^{a} ±1	7702^{c} ±5.5	8589^{a} ±2	9131^{b} ±1.5	7382^{d} ±4.5	8726^{g} ±52	9104^{b} ±3.5	8989^{h} ±1.5	7020^{c} ±1.5	8596^{a} ±4.5
Salt (g/100g)	2.10 ±0.001	2.14 ±0.000	1.93 ±0.001	2.15 ±0.013	2.28 ±0.001	1.85 ±0.000	2.18 ±0.000	2.28 ±0.001	2.25 ±0.000	1.75 ±0.000	2.15 ±0.001

Table 2. Sodium (mg/kg) and salt content (g/100g) in pork hot dogs from different Serbian meat processors

	Pork hot dogs									
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Sodium (mg/kg)	9034^{j}	6278^{a}	7496^{c}	7620^{e}	7364^{b}	7892^{g}	8296^{h}	8750^{i}	7543^{d}	7725^{f}
	±7.5	±3.00	±6.50	±6.50	±6.50	±9.00	±8.00	±2.00	±10.00	±6.50
Salt (g/100g)	2.26	1.57	1.87	1.90	1.84	1.97	2.07	2.19	1.89	1.93
	±0.001	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002	±0.000	±0.002

The sodium content in chicken hot dogs ranged from 7020 (P10) to 9131 (P5) mg/kg, corresponding with a portion of salt in products of 1.75 – 2.28 g/100g. In the samples of pork hot dogs the sodium content varied form 6278 (P2) to 9034 (P1) mg/kg, i.e. 1.57-2.26 g/100g salt share. The difference between minimum and maximum values of sodium, i.e. salt was statistically significant ($P<0.05$) in both cases, chicken and pork hot dogs. Furthermore, it could be seen that there is statistical difference ($P<0.05$) almost between all the samples considering chicken and pork hot dogs, showing diversity of salt content in hot dogs on Serbian market.

Kamenik et al. (2017) obtained mean value of sodium and salt content of 975.9 mg/100g, i.e. 2.44% from 21 frankfurter sausages purchased on Czech Republic retail network. However, Kamenik et al. (2017) also analysed frankfurter sausages from German retain network. Five samples were examined, and mean value of sodium and salt content was 781.7 mg/100g, i.e. 1.95%. Aaslyng et al. (2014) found average salt content in Danish sausages of 2.19%. Capuano et al. (2013) stated average 759 mg/100g sodium in frankfurters in the Netherlands, corresponding to 1.93% of salt. The average salt content in chicken hot dogs from this study was 2.10%, which compared with cited results is characteristic value for sausages product found on European market. Similar could be concluded for pork hot dogs. However it could be seen that chicken hotdogs found on Serbian retain network obtain significantly ($P<0.05$) higher salt content than pork hot dogs.

Nevertheless, since meat products have high salt content, there is need to reduce it and hence lower sodium intake between consumers. Many researchers are investigating possibility of salt reduction in meat products without detracting from sensory, textural, nutritional and colour properties of product (Puvača et al., 2019). Aaslyng et al. (2014) showed that reduction to 1.5-1.7% salt does not have influence on sensory characteristics. Also, Honikel (2008) stated that 1% of salt is enough dosage to improve taste of meat, and 1.5% is recommended to increase water binding capacity. In work of Kamenik et al. (2017) it could be seen that there is no significant ($P>0.05$) correlation between salt content with sensory and physico-chemical properties. Furthermore, they analysed correlation between saltiness and salt content and for frankfurters obtained statistically significant ($P<0.05$) but negative correlation. Hence there are strong proofs that salt does not have high impact on sensory and physico-chemical properties.

CONCLUSIONS

The salt content of chicken hot dogs was significantly higher ($P<0.05$) than in pork hotdogs. Sodium, i.e. salt values for hot dogs purchased from Serbian retail network was

close to values of similar products presented at EU market. From these results it could be concluded that there is possibility for producers to lower even for 50% salt content in hotdogs presented on Serbian market without changing their sensory and technological properties, and hence retain and expand their consumer circle and achieve targets that Public Health England set.

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