Salt reduction in selected food products

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Abstract. Although sodium chloride is widely used in food processing as a preservative, flavor and texture enhancer, its high intake has been reported to cause cardiovascular disease, kidney disease and gastric cancer. The use of chloride salts and the reduction of sodium chloride content in food products have been proposed as common strategies to control high salt intake. However, sodium chloride reduction in food can lead to a significant loss of flavor and texture which can be quickly noticed by consumers. To mitigate these issues, various researchers are developing techniques to reduce sodium chloride without affecting the flavor, texture and taste. In the present contribution, oven-roasted peanuts, microwave and traditional bath cooked grass crab meat and surimi emulsified sausages were studied as models to reduce salt in food and good results were achieved. The approaches used in these studies are promising and open new perspectives in the future development of low sodium chloride food products. **Keywords**: sodium chloride; salt reduction; saltiness perception, food products

1 Introduction

Sodium Chloride is applied in food processing and preparation with aims of enhancing flavor, controlling the texture and preservation. Sodium chloride has also physiological functions such as glucose and amino acids transport across the cell membrane, renal functions and maintenance of plasma volume [1]. A daily intake of 2-5g of sodium chloride is enough to perform the major physiological functions. A previous study reported that the daily consumption of sodium chloride has significantly increased to 6-12 g/day [2]. High levels of sodium intake are linked with hypertension, cardiovascular diseases, stroke and gastric cancer and kidney failure [3]. As shown in figure 1, it was revealed that high salt intake mostly originates from processed food such as roasted groundnuts, sausages, breads and cheeses etc. [4]. Roasted peanuts, processed meat (sausages, ham), breads, processed fish, cheese and fermented foods are consumed frequently and they possess high levels in sodium chloride [5]. Appropriate strategies to reduce the quantity of salts while keeping the saltiness perception in these food can decrease the risks associated with cardiovascular diseases, stomach cancer and kidney failure (figure 2).

Roasted peanuts, sausages and fish are food products widely consumed worldwide. Roasting of peanuts is a thermal dehydration process that intends to develop pertinent color, flavor and aroma [6]. Peanuts are salted with sodium chloride and subjected to 110-180°C

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during roasted. Roasted peanuts are highly appreciated due to their flavor and color. Preparation of sausages involves meat/fish grounding and mixing with other ingredients such as salts, spices and other food additives, and encased in casings followed by maturation [7]. As the process for peanuts roasting, meat, fish and sausages processing mentioned, sodium chloride is one of the ingredients which increases its consumption trends. To reduce the salt intake, some technologies have been adopted such salt replacer, modification of food structure using natural biopolymer or microwave heating [3].

Maillard reaction products are generated by heat treatments of reducing sugars and amino acids or peptides under controlled conditions [8]. Maillard reactions products have the ability to enhance the flavor of food. Biopolymers are used to modulate the food structure and enhance the salt release which may affect the saltiness perception [2]. Microwave heating is used to cook food and modify the conformation change of protein, water distribution and salt release.

In the present contribution, the authors explore salt reduction in selected food products using partial replacement by flavor enhancers such as Maillard Reaction Products. The use of polysaccharide to modify the texture and enhance salty release was also discussed. Additionally, the alteration of food protein structure and prevention of ingredients losses to modulate salt release by applying microwave heating was presented. The findings from this manuscript can help food processor and research in the rational design to reducing salt and enhance the saltiness perception in various food products.

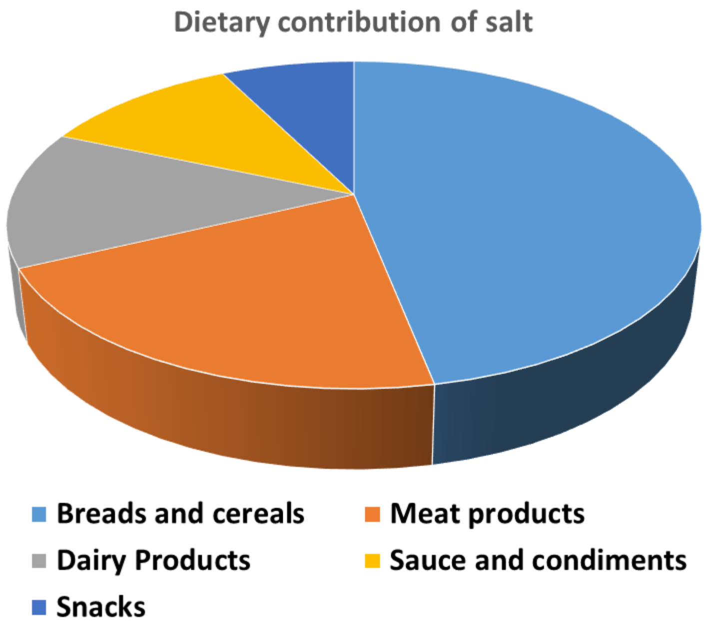

Fig.1 Dietary contribution of salt

2 Salt Reduction in Roasted Peanuts, Sausages and Meat curbs

2.1 Partial replacement of salt by Maillard Reaction Products in Microwave roasted Peanuts

The partial replacement of salt with Maillard reaction prepared using corn flour, soybean and sunflower hydrolysates as source of amino acids and xylose, and cysteine were prepared [9]. The results showed that Maillard reaction products with small molecular weight enhanced the saltiness perception. It was suggested that saltiness perception was associated with a high number of umami amino acids such as aspartate and glutamate. Besides, small peptides with a molecular weight of < 1 kDa generated during hydrolysis of plant meal and Maillard reaction improve the saltiness perception [10].

2.2 Effect of polysaccharides on saltiness perception in emulsified sausages

Polysaccharides have been successfully incorporated in sausage formulation to improve the release of salt and enhance the saltiness perception [11]. The interaction polysaccharides and surimi proteins created an architecture with porous structure which favored the diffusion and release of sodium chloride. The type of polysaccharide, molecular weight and structure affected this interaction and the diffusion of sodium chloride. Also, the adhesion and diffusion of polysaccharide in the mucus layer affects the saltiness perception [2].

2.3 Saltiness perception of grass carbs meat prepared using microwave heating

Grass curb meat was subjected to microwave heating and the saltiness perception investigated [12]. Microwave heating has been reported to increase the taste, flavor and improve the digestibility of proteins. Microwave heating of curb meat showed a low impact of protein structure, improved water and salt retention. Microwave heating enhances even heat distribution and prevents ingredients losses which favored the saltiness perception.

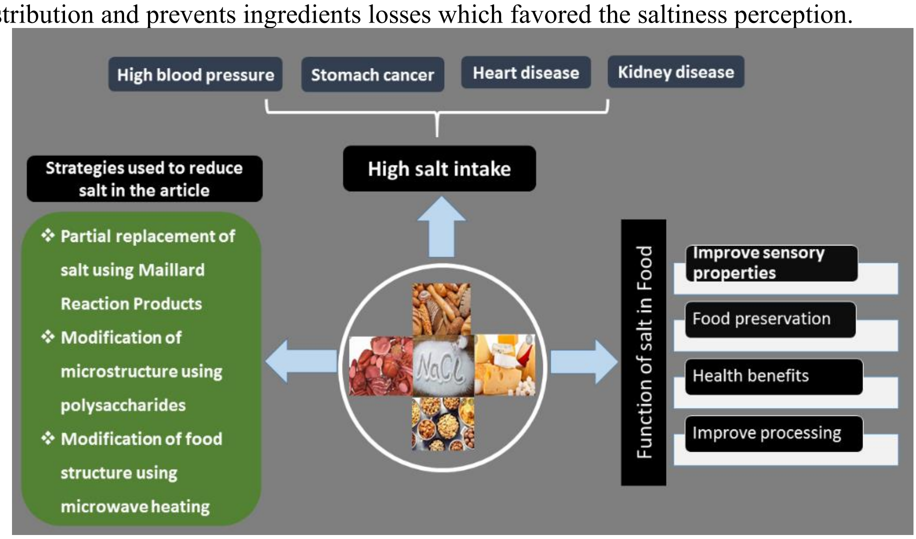

Fig. 2 Side effect of excessive salt consumption and strategies for salt reduction.

3. Conclusion

Sodium chloride is an important ingredients utilized in food to improve taste, texture and shelf life. However, excessive consumption of sodium chloride can lead to significant health problems. Hence, various strategies of salt reduction at different food processing steps is paramount. The use of salt replacer such as Maillard reaction products in food products can reduce the side effect linked to excessive salt consumption. Modification of food microstructure using natural biopolymers such as polysaccharides improves the release of salts in food matrix which may be used to reduce the salt in food. Heating techniques have demonstrated a significant impact on the food structure and retention of ingredients. Microwave heating can improve the water and salt retention that can increase the saltiness perception at low sodium chloride concentration.

3 References

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