Journal of
HYPERTENSION RESEARCH
www.hypertens.org/jhr

Review

J Hypertens Res (2016) 2(2):61–68

Less salt – more health. Croatian Action on Salt and Health (CRASH)

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Received: June 18, 2016, Accepted: June 29, 2016

Keywords: salt intake, cardiovascular disease, hypertension

Introduction

According to the World Health Organization (WHO) non-communicable chronic diseases present a major threat to human health and economic prosperity. The leading cause of global morbidity and mortality is high blood pressure and it is estimated that hypertension causes around 9.7 million deaths per year, which is more than a half of total 17 million deaths from all cardiovascular diseases [1–3]. The results of numerous studies, from epidemiological-ecological, basic experiments on animals to the clinical observations and studies, have confirmed that excessive salt intake is associated with increasing blood pressure and hypertension, which indirectly contributes to increased cardiovascular, cerebrovascular and renal morbidity and mortality. Evidence shows that excessive salt intake, beside the effect on blood pressure, promotes damage of targeted organs and consequently increases the overall risk of premature morbidity and death. In 2003, WHO and the Food and Agriculture Organization of the United Nations (FAO) adopted the recommendation that salt intake at the population level should not be higher than 5 grams per day [4]. In 2010 WHO in its Global status report on non-communicable diseases (NCD) recommended reduction of salt intake as a cost-effective activity, which should be initiated immediately in order to save lives, prevent diseases and reduce healthcare costs [5]. This activities were supported in 2011 by the Political Declaration of the United Nations High Level Meeting on non-communicable chronic diseases, which resulted in the acceptance of Global Monitoring Framework and Voluntary Global Targets for the Prevention and Control of NCDs about the reduction of salt intake by 30% until 2025, as a key objective in reduction of premature deaths by 25% in the same period [6]. Even before these official recommendations,

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several countries started to implement their national programs for the reduction of excessive salt intake. Their examples show that such programs can be organized and carried out at the national level, and that reduction of excessive salt intake over a period of several years, undoubtedly leads to a reduction of premature morbidity and mortality, significantly reducing the cost of health treatments and care. The program, which was launched ten years ago in the UK- Consensus Action on Salt and Health (CASH) served as model for everyone and since 2005 it has gradually evolved into a worldwide action- World Action on Salt and Health (WASH) [7]. The Declaration of salt reducing program in Croatia was adopted in 2006 at the Croatian Congress on Hypertension, and Croatian action on salt and health (CRASH) and National program for reducing salt intake were announced in 2007 at the Croatian Congress on Atherosclerosis. The national campaign in UK has started in 2004 and with the voluntary cooperation of the food industry and with the support of government and media monitoring, it managed to raise the population awareness of the harmful effects of excessive salt intake. This resulted in a reduction of salt intake from 9.5 grams per day in 2001 to 8.6 grams in 2008 and 8.1 grams in 2011 [7]. It has been estimated that in the UK the number of cardiovascular deaths was reduced by 9000 per year and also healthcare costs were reduced by about 1.5 billion £ per year. Experts from the United States assessed that decrease of salt intake by 3 grams per day leads to a reduction of coronary heart diseases by about 60 000 to 120 000; myocardial infarctions by 54 000 to 99 000 and stroke by 32 000 to 66 000 per year [10]. All segments of society would benefit, and it is estimated that this reduction would bring savings to health care system for about 10-24 billion US dollars per year. The calculation shows that gradual reduction of salt intake by one gram per year would be more efficient (cost-effective) than the use of all antihypertensive drugs in treatment of hypertensive patients. According to results of EH-UH Study (Epidemiology of Hypertension in Croatia), the prevalence of hypertension in adult population is around 37% which means that in Croatia live about 700 000 patients with hypertension [11]. According to these data, reduction of salt intake at the population level for only 3 grams per day could lower the blood pressure by about 1-2 mmHg. The average cost of lowering blood pressure by medicaments per month is about 1 Euro per mmHg, so elementary math indicates that this simple and cheap measure could save around 8 million Euros in the Croatian budget. These are only savings on medicaments because costs of the complications of uncontrolled hypertension are few times higher. Excessive salt intake in addition to being directly related to the height of the blood pressure, the incidence of hypertension, poor control of treatment and cardiovascular morbidity and mortality is, also, associated with chronic kidney disease, nephrolithiasis, osteoporosis, asthma and some cancers, which certainly undermines the health of the population and increases healthcare costs. However, recommendations for reducing salt intake can raise doubts that it would lead to a recurrence of the global incidence of the diseases associated with iodine deficiency (cognitive dysfunction, congenital anomalies, hypothyroidism, cretinism, endemic goiter) as most countries adopted resolution No. 43 of the General Assembly of the WHO iodination of table salt [12]. According to WHO, the Foundation for the United Nations Children's Fund (UNICEF) and the International Council for the Control of Iodine Deficiency Disorders (ICCIDD, 1996) recommendation for iodine daily intake is 150 μg (for pregnant and lactating women 220 to 290 μg). In Croatia all table salt used for nutrition is iodinated [13, 14]. According to the assessment that the average salt intake in Croatia is about 10 grams per day and the fact that table salt is iodinated by adding 25 mg of iodine per kilogram of salt, the iodine intake is 250 mg per day. By reduction of daily salt intake to 5 grams, iodine intake would be 125 mg per day. This is slightly lower than recommended but sufficient because this daily iodine intake does not include the iodine from other sources in nutrition (milk, eggs, seafood, etc.), which also contribute to the total daily intake. In addition, all relevant international institutions recommend that reduction of excessive salt intake is carried out gradually by the dynamics of 4% per year, which means that during the first years of implementation of the national campaign, there is not the slightest concern about the reduction of iodine intake. The WHO document from 2013 which deals with the issue of iodine intake in programs of reduction of excessive salt intake, emphasized how the programs for reduction of excessive salt intake and programs that advocate the necessity of iodination are equally important and compatible. It was pointed out that the fact that iodinated table salt is safe and proven

Table 1. Salt intake estimated using urinary sodium excretion.

	„Salt-mapping" 24-hour urine	Rural Kawasaki	INTERSALT	Tanaka
Whole group				
Urinary Na (mmol/l)	201 (75.5)	216.20 (77.90)	207.40 (51.21)	177.79 (60.86)
NaCl intake (gram/day)	11.6 (4.5)	12.64 (4.55)	12.12 (2.99)	10.39 (3.56)
Men				
Urinary Na (mmol/l)	228.6 (74.2)	224.87 (78.52)	190.41 (39.28)	182.50 (48.00)
NaCl intake (gram/day)	13.3 (4.3)	13.14 (4.59)	11.13 (2.30)	10.67 (2.81)
Women				
Urinary Na (mmol/l)	177.3 (69.1)	210.68 (77.03)	218,18 (54,86)	174.71 (67.84)
NaCl intake (gram/day)	10.2 (4.2)	12.31 (4.50)	12.75 (3.21)	10.21 (3.96)

way of iodine intake, cannot be used as an argument against the reduction of excessive salt intake. In parallel with the reduction of salt intake, individual countries must estimate how much they must be increased the iodination in order to ensure satisfactory iodine concentration in the population. It is recommended that iodine intake is determinate from the 24-hour urine as well as it is recommended that salt intake is the most exactly estimated by determining 24-hour natriuria. It should be pointed out that the price of salt iodination is very low and even the possible need for additional iodination would not raise the cost of programs for reduction of excessive salt intake [15].

Salt intake in Croatia

Morbidity and mortality from cardiovascular disease in the age group younger than 65 years in Croatia, despite the observed positive trend of downsizing, are still very high. One of the main reasons is the high prevalence of hypertension, which is according to the results of the EH-UH studies in the adult population 37% [11]. Although a large number of hypertensive patients in Croatia are treated, control of hypertension is achieved in less than 25%. Excessive salt intake significantly contributes to such poor result [16]. The main problem in Croatia, as in most countries worldwide, is the fact that about 75-80% of salt originates from so-called hidden sources, mostly from processed and semi-processed food products. Without our knowledge we daily consume food that contains significantly more salt than sea water (pizza 60%, lasagna 40%, sausages 100%, bacon 200%, dried fish 190%, cheese 130%, crackers 60%, chips and ketchup 110% cornflakes 110% compared to sea water). About 15% of the daily intake of salt is added during food preparation, and only 10-15% comes from its natural origin which is actually sufficient for normal physiological functioning. The greatest amount of daily salt ingestion is via bakery products, since they contain a large proportion of salt, but more importantly they are the food our population consumes in the largest quantities.

Excessive consumption of salt in Croatia was identified on several levels. 1. The salt intake based on a 24-natriuria and from spot morning urine samples; 2. The association of salt intake and the values of blood pressure; 3. The awareness of the general population about the harmful effects of excessive salt intake; 4. The salt content in bakery products.

1. Salt intake estimated from urinary sodium excretion

In the first Croatian survey salt intake was estimated using 24-hour sodium excretion (Salt-mapping survey) in an urban and rural population in general practitioner outpatient clinic of late dr. Aleksandar Jovanovic (Dugave, Zagreb) and dr. Inga Erceg (Lasinje) [16]. Twenty-four-hour sodium excretion and blood pressure were measured in a random sample of 504 subjects on regular diet aged 46.3 +/- 7.3 years and additionally a structured questionnaire on life-style and

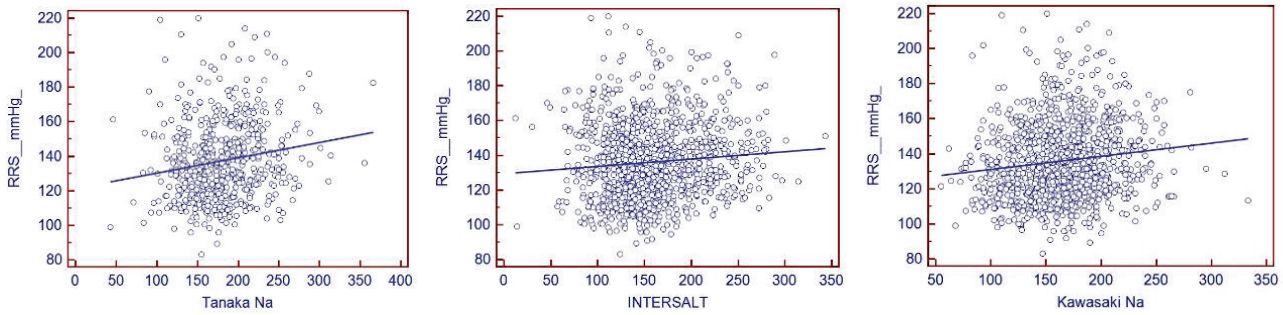

Figure 1. Association of salt intake and systolic blood pressure in general population determined using three salt excretion estimation formulas. (RRS - systolic blood pressure).

salt awareness was administered. Mean 24-hour sodium excretion in rural population was 212 +/- 83.3 mmol and in urban 189.2 +/- 57.1 mmol. Men had a higher mean sodium intake than women (228.6 +/- 74.2 vs. 177.3+/-69.1). Values are presented in Table 1. In this survey only 9.7% of subjects had daily sodium intake less than 12 g. The highest salt intake was 29.5 g/day in one male subject. We carried out additional analyses in persons with metabolic syndrome who are more prone to salt-sensitive hypertensions [17]. In this survey we found a statistically significant correlation of salt intake and body mass index (BMI) (r=0.32), waist circumference (r=0.51), fasting blood glucose (r=0.35), uric acid (r=0.53), cholesterol (r=0.27) and triglycerides (r=0.43). Subjects with metabolic syndrome had higher sodium excretion than controls (235.4±93.3 vs. 192.6± 572; p=0.03).

Another survey was carried out as a part of a clinical-epidemiological study in a continental rural part of Croatia with a sample of 1669 subjects (random door-to-door sample) in which salt intake was determined in a morning urine sample using three validated formulas (Intersalt, Tanaka, Kawasaki) [18]. At the time of designing the study there was not yet awareness about the limitations of determining salt intake from random urine sample. This fact has to be taken into consideration when evaluating these results. However, even when taking overestimation or underestimation into account, these results can be considered valid indicators of salt intake in the Croatian population. Blood pressure was measured using the same method as in the previous survey and the same questionnaire was applied. Salt intake was similar to the intake in previous survey. These results are presented in Table 1. In a con-

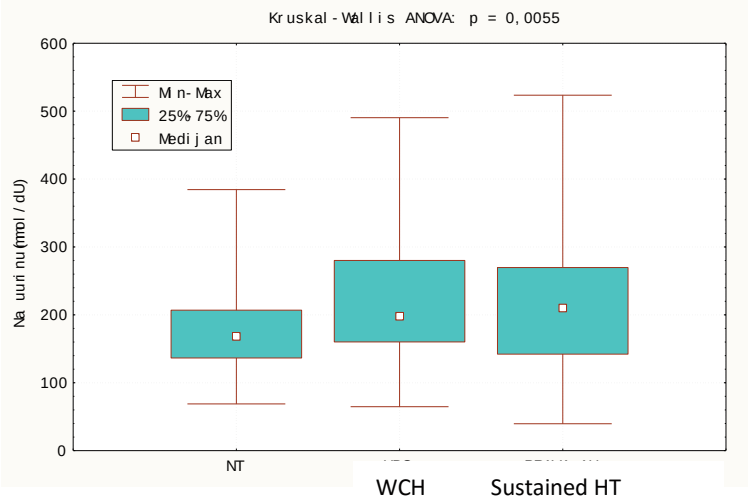

Figure 2. Values of 24-hour sodium excretion according to blood pressure categories (NT= normotensives; WCH= white coat hypertension; sustained HT = new onset untreated stage 1 hypertension).

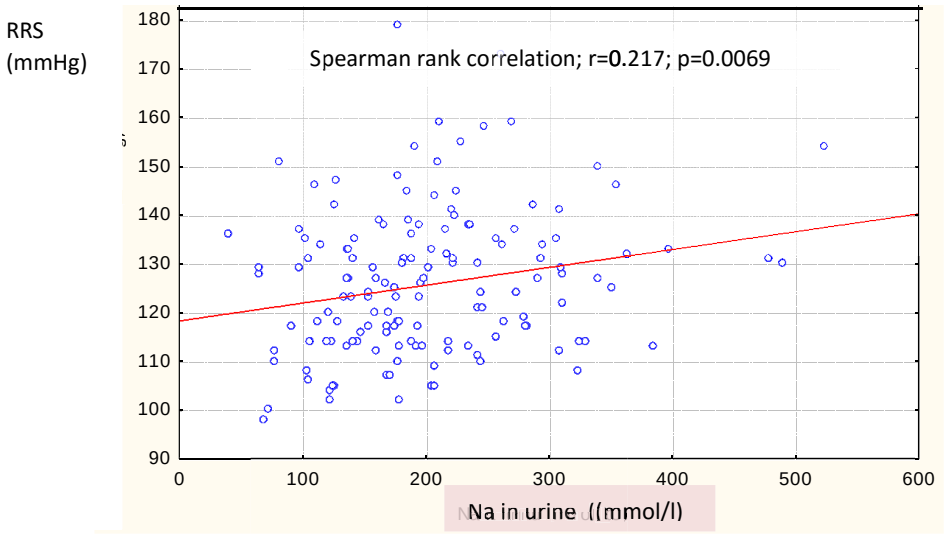

Figure 3. Association of salt intake and systolic blood pressure (RRS) measured using 24-hour ambulatory blood pressure measurements.

tinuation of this survey, we estimated salt intake from a 24-hour urine sample which is a „gold standard"for salt intake assessment and using this method all subjects had intake higher than 5 g per day [19].

2. Association of salt intake and blood pressure

Association of salt intake and blood pressure was found in both previously mentioned studies in men and women. Figure 1 shows regression lines indicating the association of salt intake estimated from urinary sodium in first morning spot urine sample. We used all three validated and frequently used formulas (Tanaka, Intersalt and Kawasaki) and found a statistically significant association (Tanaka: B 0.09 SE; p<0,001; Intersalt: B 0.04 SE 0.01; p=0.002; Kawasaki: B 0.08 SE 0.02; p<0.001). It is also important to mention the third survey carried out in a group of newly diagnosed untreated hypertensives in which blood pressure was measured using 24-hour ambulatory measurement (SpaceLabs 90207) [20]. Subjects were on a regular diet with free sodium intake and measurement of blood pressure was done during a regular working day. Subjects were divided in three groups – normotensive subjects (N=62), subjects with white coat hypertension (N=64) and new onset grade 1 hypertension (N=55). Sodium excretion was estimated using a 24-hour urine and were lower in normotensives, higher in subjects with white coat hypertension and highest in hypertensive subjects (168; 68-384 vs.198; 64-490 vs. 210; 39-524) (Figure 2). We found a significant difference between normotensives and both hypertensive groups, with no difference between white coat hypertension and grade 1 hypertension. A significant correlation of salt intake (24-hour sodium excretion) and systolic blood pressure (Figure 3) which is similar with Intersalt results. Correlation of salt intake and blood pressure was found in subgroups of subjects divided in blood pressure categories (Figure 4).

3. Awareness of harmful excessive salt consumption

Above-mentioned questionnaire gave us data about the awareness of general population on the harmful high salt consumption, data on knowledge about which food contains more salt, data on eating habits and readiness of changing them. Data were collected in the random sample from the urban population during public campaign – World Hypertension Day. Presented data (Table 2) clearly show that the awareness among urban population is quite high, but lacking in the rural population. Vast majority of examinees underline the need of the reduction of the table salt consumption, and confirm that they are willing to follow given instructions on reducing high salt intake. Surprisingly every fourth examinee was aware of excessive salt intake. These discrepancies have showed that the real awareness about table salt consumption is really low. However, our data on 24-hour sodium urine excretion

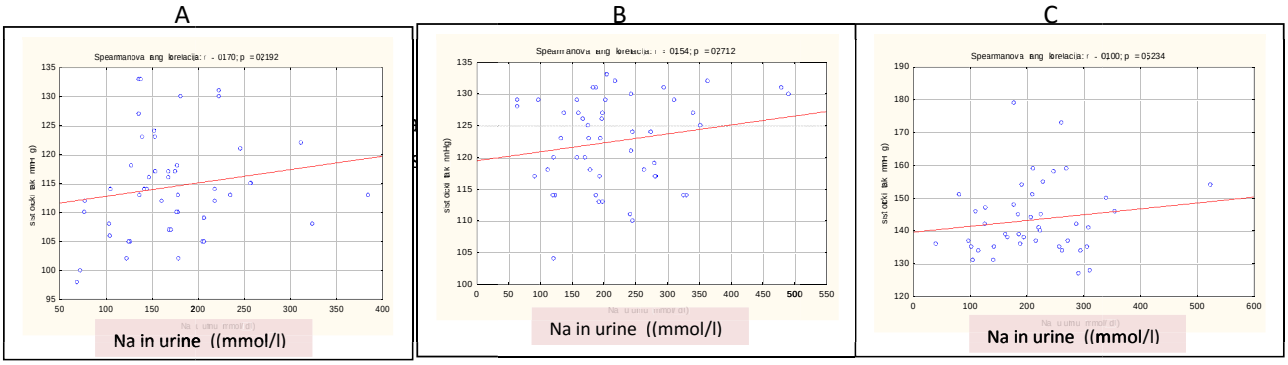

Figure 4. Association of salt intake and systolic blood (ABMP) in normotensives (A), subjects with white-coat hypertension and untreated stage 1 hypertensives (C).

are not in line with these results, where only 9.7% of population has natriuresis less then 6 g per day.

4. Salt in bakery products

The percentage of table salt in the bakery products /bread/varies from 0.96 to 2.05% (average 1.56%). That means if we consume only two slices of bread (100g) we will ingest 1.56 grams of table salt. Other bakery products have this ratio even higher. For example, if you consume one salted pretzel (70g) you intake 2.09 g of kitchen salt which is 1/3 of daily need. Data from Croatia shows that Croatian population mostly consumes white bread, average 4 slices per day. That daily serving consist more than 3 grams of salt [19]. Maja Miškulin and Danijela Periš in 2009 analyzed eating habits of the school aged children of city of Osijek and concluded that 32 % consume daily some type of bakery product. Rolls as everyday snack consume 28.3 % girls and 35.9% boys [22]. These data are in concordance with data presented by Kaic-Rak et al. examining eating habits of school children aged 7-15 years. Authors used questionnaire focused on eating habits and reported that average daily salt consumption was 9 grams (42-49% was from bakery products) [22]. Croatian food agency conducted similar survey and reported that salt intake from bread and bakery products in the population aged 18-64 years from Slavonia region is 2.43 grams daily (bread 1.98 grams, rolls 0.45 grams) [24]. The proportion of salt in some stuffed products is also very high (up to 2.92 %) All these data are in concordance with reports from United Kingdom [25]. Various types of snacks also have especially high pro-

Table 2. Awareness about danger of high salt consumption and the importance of changing eating habits.

	"Salt Mapping"	Rural study	World Hypertension Day Zagreb
Is salt harmful? YES	94%	66.2% f 64.2% m	93.6%
Do you consume too much salt? YES	27%	29.9% f 25% m	33. 2%
Is it important to cut down salt consumption? YES	88%	60.9% f 57.4% m	
Will you follow given instructions on cutting down salt intake? YES	85.8%	86.5% f 62% m	86.3%

portion of salt. In some of the products this proportion exceeds 5% with average of 2.81 %. Unfortunately these products are very often consumed on daily basis. One pack (100 g) of such product contains half of the daily salt needs. In most of the cases consumer is not aware about that fact [26].

How to succeed in efforts?

Only one year after world action for cutting salt was launched (WASH), Croatia started own national campaign - CRASH – Croatian Action on Salt and Health. As shown, several important studies were conducted that revealed also alarming results in Croatia. Salt intake in Croatia is more than two times higher than recommended (5-6 grams). Rural population consumes significantly more salt than urban population; males consume more than females – all these findings are in concordance with the result from other countries. Similar finding was that high salt consumption correlates with blood pressure values. Therefore preventive measures can reduce early cardiovascular morbidity and mortality. Patients with metabolic syndrome tend to consume more salt. Cutting salt for 3 grams daily can lower overall blood pressure for 2-3 mmHg. This could result in cutting cardiovascular morbidity and mortality similar as achieved when using antihypertensive therapy. Economically this reduction can save more than ten million Euros yearly. This rough estimation excludes chronic kidney disease, nephrolithiasis, osteoporosis, gastric and nasopharyngeal cancer. All these findings are more than sole mathematical numbers or results of equation – they indirectly show the level of general population health. In Croatian population the awareness about harmful effect of the high salt consumption is very low. Although data show that salt intake is two times higher than recommended, majority of patients are unaware of this fact. Subjects who were aware about the harmful effect of salt got that information from media what is overall positive and the way as campaign should be done. The fact that worries is that they did not get that info form their physicians. According to the EH-UH study 70% of hypertensive patients were informed about the harmful effect of salt, what means that one third of patients did not get any info about the harmful effect of the salt. According to the anonymous questionnaire less than 4% of patient were compliant with the advices what were given by leading physicians. Above-mentioned situation is alarming and the sign of poor awareness and the need for better education and a need for better public campaigns [27]. Future actions should include better and continuous education of general population but also of physicians and other medical personnel as well, pointing on harmful effects of the salt consumption and the need to be more compliant with the recommendations. Since 75 % of ingested salt comes from processed food, it is essential to include a food industry in the national cutting salt program. Some steps pointing in this direction were already taken – contacts with food industry were established what resulted in increased awareness from bakery industry who started to be compliant with new less salt recipes. Step by step salt reduction proposed by the WHO, UN and EU will help to adopt taste buds of general population on less salted food. This action will not have negative impact on industry. Baking industry plays essential role in the program of salt reduction. All countries that have achieved some goals in the cutting salt campaigns had a bakery industry as a big alliance while other branches of industry were included in the program by government acts. Croatian national program – CRASH – Croatian action on salt and health should have similar background: a vivid collaboration of the experts, science, industry and government that will follow all activities by providing new legal acts and laws.

References

1. Lloyd-Jones D, Adams R, Carnethon M et al.: Heart disease and stroke statistics — 2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2008; 119(3):e21-e181, 2008.
2. 2. Lim SS, Vos T, Flaxman AD et al.: A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012; 380:2224-2260.
3. World Health Organization: A global brief on hypertension, World Health Day 2013. WHO, Geneva, 2013.
4. World Health Organization: Reducing salt intake in populations, Report of a WHO Forum and Technical meeting. WHO, Geneva, 2008.
5. World Health Organization: WHO guideline: Sodium intake for adults and children. WHO, Geneva, 2012

6. World Health Organization: Set of 9 voluntary global NCD targets for 2025. 2011. http://www.who.int/nmh/global_monitoring_framework/en/ access (25.8.2014.)
7. He FJ, Jenner K, MacGregor G: WASH-World Action on Salt and Health. Kidney International.2010; 78:745-753.
8. Jelaković B, Skupnjak B, Reiner Ž: Declaration on importance of launching national campaign for salt consumption reduction. Oral presentation. 1st congress of Croatian hypertension society, Zagreb, 2006.
9. Reiner Ž, Skupnjak B, Jelaković B: Launching promising national campaign for salt reduction in Croatia. Oral presentation. 6th congress on atherosclerosis, Rovinj, 2007.
10. Bibbins-Domingo K, Chertow GM, Coxson PG et al.: Projected effect of dietary salt reductions on future cardiovascular disease. The New England Journal of Medicine. 2010; 362:590-599.
11. Jelaković B, Željković-Vrkić T, Pećin I, Dika Ž, Jovanović A, Podobnik D et al.: Arterial hypertension in Croatia: Results of EH-UH study. Acta Medica Croatica. 2007; 61:287-292.
12. World Health Organization: Forty-third World Health Assembly, Resolution WHA43.2.Prevention and control of iodine deficiency disorders. WHO, Geneva, 1990.
13. Kusić Z, Novosel SA, Dabelić N, Punda M, Roncević S, Labar Z, Lukinac Lj, Nöthig-Hus D, Stanicić A, Kaić-Rak A, Mesaros-Kanjski E, Karner I, Smoje J,Milanović N, Katalenić M, Juresa V, Sarnavka V: Croatia has reached iodine sufficiency. Journal of Endocrinological Investigation. 2003; 26:738-42.
14. Kusić Z, Jukić T, Rogan SA, Juresa V, Dabelić N, Stanicić J, Borić M, Lukinac L, Mihaljević I, Punda A, Smokvina A, Topalović Z, Katalenić M: Current status of iodine intake in Croatia-the results of 2009 survey. Collegium Antropologicum. 2012; 36:123-128.
15. World Health Organization: Mapping salt reduction initiatives in the WHO European Region, 2013. http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/publications/2013/mapping-salt-reduction-initiatives-in-the-who-european-region (25.8.2014.)
16. Jelaković B, Premužić V, Čvorišćec D,Erceg I, Fuček M, Jelaković M, Jovanović A, Kaić-Rak A,Laganović M, Lederer P,Pećin I, Perković M, Reiner Ž, Sertić J, Špišić T: Salt Mapping in Croatia. Croatian Action on Salt and Health (CRASH). Kidney and Blood Press Research. 2009; 32:323.
17. Pećin I, Premužić V, Čvorišćec D, Erceg I, Fuček M, Jelaković M, Jovanović A, Kaić-Rak A, Laganović M, Lederer P, Perković M, Reiner Ž, Sertić J, Špišić T, Jelaković B: Salt Intake and the metabolic syndrome. Croatian Action on Salt and Health (CRASH). Kidney and Blood Pressure Research. 2009; 32:324.
18. Dika Ž, Pećin I, Čvorišćec D, Fištrek M,Fuček M, Karlović K, Kos J, Luketić P, Miletić-Medved M, Mišić M, Muldini M, Premužić V, Sertić J, Vuković I, Jelaković B: Salt intake in a continental rural part of Croatia – estimated population 24-h urinary sodium excretion using spot urine sample, Kidney and Blood Pressure Research. 2009; 32:323.
19. Keranović A, Dražić I, Gardijan B, Križančić J, Modrić Ž, Vrkljan A-M, Sović S, Vitale K, Jelaković B: Hypertension and salt intake-preliminary results from study obtained in undeveloped rural part of Croatia. Kidney and Blood Pressure Research. 2010; 33:421.
20. Pezo-Nikolić B: Clinical use of ambulatory blood pressure measurement in early stage of essential hypertension. Master thesis. (mentor B.Jelaković). University of Zagreb, School of medicine, Zagreb, 2009.
21. Pucarin-Cvetković J, Polašek O, Kern J, Vuletić S: Regional features of Croatian nutrition, in Book of Abstracts, Scientific meeting on cardiovascular health, nutrition and salt, Croatian academy of medicine science, Zagreb, 2008.
22. Miškulin M, Periš D, Ugarčić-Hardi Ž, Dumančić G: Hidden salt in school children diet- is there a reason for concerned? 34th international meeting "Health ecology in practice", Zagreb, 2010.
23. Kaić-Rak A, Antonić Degač K, Pucarin-Cvetković J, Heim I, Rak B: Salt in nutrition of school children. Croatian journal for public health. 2010; 6:1-4.
24. Jurković M, Marijanović-Vincetić D, Jurković Z, Mandić ML, Sokolić-Mihalak D: Salt intake through bakery products in Slavonia region. In 7th International Congress "Flour-Bread '13" and 9th Croatian Congress of Cereal Technologists "Brašno-Kruh '13", 2013; 42-49, Faculty of Food Technology, Osijek.
25. Marreno N, He FJ, Whincup P, MacGregor G: Salt intake of children and adolescents in South London. Hypertension. 2014; 63:1026-1032.
26. Ugarčić-Hardi Ž, Dumančić G, Pitlik N, Koceva Komlenić D, Jukić M, Kuleš A, Sabo M: The salt content in bakery products in Osjecko-baranjska County. In Proceedings of 5th International Congress „Flour-Bread 09" and 7th Croatian Congress of Cereal Technologists, 2010; 551-556. Faculty of Food Technology, Osijek.
27. Mihalić M, Perković M, Špišić T, Erceg I, Fučerk M, Jovanović A, Jelaković M, Kaić Rak A, Laganović M, Lederer P, Pećin I, Premužić V, Reiner Ž, Jelaković B: Important role of nurse in Croatian Action on Salt and Health (CRASH). Croatian salt mapping. Kidney and Blood Pressure Research. 2009; 32:324.