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Prevalence, awareness, treatment and control of hypertension and salt intake in some rural areas of Sisak – Moslavina county, Croatia

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Abstract

Background and Purpose: High salt intake through food rich in salt is one of the important risk factors for hypertension, and even modest reduction in salt intake lowers the blood pressure (BP). In Croatia *91.6 % of the total territory is classified as rural and 47.6% of population live in rural regions. The study was conducted in order to determine salt intake and awareness on harmful effect of salt on BP, prevalence, treatment and control of hypertension in rural part of Sisak – Moslavina County (SMC), third largest county in Croatia.*

Materials and Methods: *In total there were 107 participants, 50 (46.7%) male, and 57 (53.3%) female. Hypertension was defined as systolic BP ≥ 140 mmHg and/or diastolic BP ≥ 90 mmHg, and/or current treatment with an antihypertensive medication. Treated hypertension was defined as the current use of an antihypertensive medication.* Salt intake *was estimated based on questionnaire results.*

Results: *Prevalence of hypertension was 84% for male and 77.2% for female. Out of 88 hypertensive participants, 76.7% were treated, and hypertension of 59.1% was uncontrolled. Salt intake was high. 71% of participants were aware that salt intake is related to hypertension, 70% did not know main sources of salt intake in every day meal, and only 39.2% were advised by health professionals.*

Conclusion: *Prevalence of hypertension, nutrition without variety but rich in salt, and unsatisfactory knowledge on harmful effect of salt on BP and health should attract attention of national and local public health authorities to apply proper measures.*

INTRODUCTION

High blood pressure (HBP) is major risk factor for cardiovascular diseases (CVD), and leading cause of death worldwide *(1)*. In Croatia CVD cause more than 50% of all the deaths *(2)*. Prevalence of hypertension has increased in the last decades. This could primarily be explained by strong influence of environmental factors. Many epidemiological and interventional studies have proved that high salt intake is one of the most important risk factors for HBP *(3)*. High intake of salt makes and keeps elevated blood pressure, and even modest reduction in

salt intake lowers the blood pressure (BP). Reducing salt intake in daily meals should be the main measure in primary prevention of cardiovascular and renal diseases, and it should be repeatedly emphasized not only to hypertensive patients, but also to the population at large *(3)*. Salt reduction is one of the most cost-effective strategies to combat the epidemic of HBP, associated CVDs and general improvement of population health *(4)*. Croatia developed National programme for the reduction of salt intake, which among other activities gathered data on current salt consumption. It is estimated that salt intake is high and well above the recommended limits *(5, 6)*.

Rural Development Strategy of the Republic of Croatia has defined differences between rural and urban area according to the definition of the Organization for economic co-operation and development (OECD) which is based on population density. On the local level, area is defined as rural if it does not exceed threshold of 150 residents per km^2. On the regional level, OECD define three sets of regions, based on proportion of population living in rural area, as: predominantly rural region (more than 50% of inhabitants in region live in local rural area), significantly rural region (15–50 % of inhabitants in region live in local rural area) and predominantly urban region (less than 15% of inhabitants in region live in local rural area). Based on the OECD criteria, 91.6 % of the total Croatian territory is classified as rural, 88.7% of settlements are situated in rural regions, and 47.6% of population lives in rural regions. Out of 21 counties in Croatia, 14 including Sisak – Moslavina County (SMC) are predominantly rural, 6 are significantly rural, and City of Zagreb is only urban county *(7)*. Such a situation has significant influence on economical orientation of the entire country and organization of the public services as education and health care system.

SMC, third largest county in Croatia located in central part of Croatia with the surface of 4.467,55 km^2 takes up 7.89% of the Croatian territory. There are 456 settlements in the SMC structured into 19 units of local government, 6 towns and 13 municipalities *(8)*. The population density is 41.5 residents per km^2. It is less than the state average (78.5 residents per km), and among last four counties in Croatia. According to the Census 2001 SMC has a population of 185.387 (4.18% of state population), 89.127 males (48.1%) and 96.260 females (51.9%). From the total number of the inhabitants 22.5% were aged under 19, and 18.1% were aged 65 or older. In terms of sex and age, number of males and females were similar in all age groups except in group 65 or older in which females were predominant. With respect to Census 1991 number of inhabitants had decreased 27%, and age structure had changed, there were less inhabitants aged 19 and less, and more inhabitants aged 65 or older *(9, 10)*. The trends of aging population in developed world are present in Croatia as well *(11, 12)*.

The Republic of Croatia has defined certain areas of the Croatian territory as Areas of special state concern (ASSC). ASSC represent 15.3% of the total population in Croatia. There are three categories of areas within ASSC; the first and the second categories include areas underdeveloped as a result of activities during the Homeland war, and the third category comprises areas developed below average by reference to economic, demographic and certain other additional criteria *(13)*. In terms of health care services those regions are underserved with difficult access to primary health care due to the lack of public transportation, age of the inhabitants and general poverty.

The aim of this study was to determine prevalence, treatment and control of hypertension as well as salt intake and awareness of harmful effect of salt, in rural part of SMC, classified as ASSC. These data could serve as basis for organizing efficient health care and developing health interventions specific for such living conditions and regions. Also it is in the demographic and general economic interest of each county and state in to keep vast empty areas populated and this possible only if adequate infrastructure exists.

METHODS

The study was cross- sectional survey conducted from January to April 2010 in community of three villages Gradusa, Sjeverovac, and Staro Selo, in SMC. Villages Gradusa and Sjeverovac are classified as first category, and village Staro Selo as second category of ASSC *(13)*. The target population was residents aged 18 year or older, and sample consisted of all inhabitants present at their houses at the moment of survey. Sample was composed on door to door basis. Exclusion criteria were pregnancy, terminal illness and upper limbs amputations. At the moment of survey 125 inhabitants 18 years of age or older were present in those three villages. Out of them, 121 agreed to participate in the study (participation rate 96.8), 14 of them participate only in urinary sodium measurement. Final sample consisted of 107 participants, 50 (46.7%) male and 57 (53.3%) female who completed questionnaire, collected urine and had BP measured. There were no statistically significant differences between included and excluded participants regarding to mean age (65.8±15.2 vs. 57.7±13.6, p=0.8) and gender ratio (50/64 males vs. 57/61 females p=0.5).

Study was conducted using questionnaire and guidelines of the National programme for the reduction of salt intake in Croatia, and included questionnaire, BP and urinary sodium measurement. Questionnaire provided information on demographic characteristics, history of hypertension, information on awareness of harmful effect of salt, and treatment of hypertension. Study protocol was approved by bioethical committee of Medical School, University of Zagreb, and all participants gave informed consent.

BP was measured following guidelines of the European Society of Hypertension (ESH) and the Joint National Committee (JNC) VII using Omron devices *(14)*. Two measurements in both arms in the sitting position after 5 minutes rest and 30 minutes after smoking and

caffeine consumption were taken from every participant with two minute interval between them. Average systolic and diastolic blood pressures in both arms were calculated for each participant. If there was difference between arms, value of blood pressure in the arm with higher BP was taken for diagnosis of hypertension.

Hypertension was defined according to the guidelines of ESH and JNC VII as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg, and/or current treatment with an antihypertensive medication *(14)*. Awareness of hypertension was defined as reported prior diagnosis of hypertension by health professional. Treated hypertension was defined as the current use of antihypertensive medication. The controlled hypertension was defined as treated hypertension with SBP <140 mmHg, and DBP <90 mmHg. The uncontrolled hypertension was defined as treated hypertension with SBP ≥140 mmHg, and DBP ≥90 mmHg. Treatment of hypertension was noted investigating medications that participants currently use *(15, 16)*. Salt intake was estimated based on questionnaire.

Data for continuous variables were expressed as mean (±) standard deviation (SD) and Student's t-test was used for intra-group and inter-group comparisons. Pearson's χ^2 test was used for comparison of frequencies. To define normal distribution of variables we used Kolmogorov – Smirnov algorithm when sample was < 50, and Shapiro – Wilk when sample was > 50. 95% confidence interval (95% CI) were given where relevant. As statistically significant was considered $P < 0.05$. Data were analyzed using Statistica statistical package (Stat Soft INC, Tulsa, OK, USA).

RESULTS

In the final sample of 107 participants, there was no statistically significant difference between men and women regarding mean age (65.4±16.2 vs. 65.7±14.3, p=0.9). In age groups 18–34, 35–64, ≥65 there were 11.1%, 27.8%, 61.1% male, and 8.3%, 33.3%, 58.4% female respectively, with no statistically significant difference in age structure between genders (p=0.8).

The mean BP values were 149.4/87.4 mmHg ± 22.9/12.7. There were no significant differences in mean SBP and mean DBP between man (151±22.8 and 87.7±12.4) and woman (148±23.1 and 87.1±13.1), p=0.7 for SBP, and p=0.8 for DBP.

Table 1 shows prevalence, awareness, treatment and control of hypertension. Difference in prevalence between man and women has no significance as related CI 95% overlaps. Among them for the first time BP was measured above 140/90 in 23.3% participants. In treated hypertensive participants that measured BP, SBP control were achieved in 18.2% and DBP control in 42.2%.

Estimated salt intake was high in all enrolled participants. Participant's main diet constituent is homemade cured meat, bread, and canned food. Vegetables and fruit are consumed only during the season. They add more than a teaspoon of salt while cooking and at the table. As main sources of salt intake participants indicated cured meat, snacks, and salt added while cooking or at table adding it to already cooked food. Only one participant indicated bread as source of salt intake. Knowledge, attitudes and practice on salt intake is presented in Table 2.

TABLE 1

Prevalence, awareness, treatment and control of hypertension.

Hypertension	All % (95% CI)	Male % (95% CI)	Female % (95% CI)
Prevalence	80.4 (72.9–87.9)	84 (73.9–94.1)	77.2 (66.3–88.1)
Awareness and treatment	75 (66–84)	81 (69.1–92.8)	72.7 (59.6–85–9)
Newly diagnosed hypertension	23.3 (14.3–32.3)	19 (7.2–30.9)	27.3 (14.1–40.4)
Controlled hypertension (SBP<140 mmHg, DBP<90 mmHg)	18.2 (8.9–27.5)	17.6 (4.8–30.5)	18.8 (5.2–25.6)

TABLE 2

Knowledge, attitudes and practice on salt intake.

Variables	N (%)			Significance, χ^2 p
	All N=107	Male N=50	Female N=57	
Know that salt intake is related to hypertension	76 (71%)	33 (66%)	43 (75.4%)	p=0.29
Advice on reduction of salt intake from physician	42 (39.2%)	21 (42%)	21 (36.8%)	p=0.59
Do not know main sources of salt intake	75 (70%)	38 (76%)	37 (64.9%)	p=0.21
Consider their salt intake as normal	69 (64.5%)	30 (60%)	39 (68.4%)	p=0.36
Could reduce salt intake	47 (43.9%)	19 (38%)	28 (49.1%)	p=0.25

Majority of participants (57.6%) were treated with only one antihypertensive medication, 28.8% with two, and 13.6% with three or four medications. The most common used medications in treatment of hypertension are angiotensin – converting enzyme inhibitors (63.6%) followed by diuretics, beta blockers and calcium channel blocker.

DISCUSSION

During visits to the households we found that 125 inhabitants aged 18 or over currently live in this community. According to the Census 2001 there were 230 inhabitants in this age group living in the community *(9)*. This difference could be explained partially with death of inhabitants, and partially with migration due to the war operations in this region. Although state recognizes economic underdevelopment of ASSC areas, so inhabitants and business entities are entitled to certain incentive measures, small number of people came back after the war. However, certain number of them kept this address as their permanent place of residency given the fact it is their only real estate property in Croatia. Young generations particularly migrate for better job opportunities. The United Nations Development Programme recognized need of development of ASSC providing programmes for support to social groups and individuals in those areas who are at risk of social exclusion and poverty in spheres of health, education, income, labor market, civil participation (17), but this still does not meet the substantial needs of population. Recently SMC introduced compensation fees for business entities because real estate values were lover in ASSC areas and they could not be used as assurance for investment projects. Demographic and educational characteristics of population in ASSC vary, but are overall insufficient, largely depending on work availability and transportation infrastructure *(18)*.

Prevalence of hypertension was high, 84% for man and 77.2% for woman. According to the Croatian adult health survey prevalence of hypertension in Croatia in 2003 were 40.5% for man and 34.9% for woman, and 40.6% for man and 36.98% for woman in Central Croatia where our community is situated *(19)*. According to the results of EH-UH study published in 2007, 37% of the adult population in Croatia has hypertension, 35.2% of man and 39.7% of woman, although women are more aware, more often treated, and blood pressure control was more frequently achieved than in men *(20)*. Difference between those two studies could be explained by slightly different methodology. Croatian adult health survey counted all those who had elevated BP at the time of survey, regardless treatment, and regardless usual BP values in those examinees. Reasons of high prevalence of hypertension in our study could be high salt intake and ageing of population. Varies studies on elderly show high prevalence of hypertension *(11, 21),* fostered by high salt intake *(22)*.

Awareness of hypertension ranged from less than 50% in Portugal and Romania, to 66% in UK, 70% in Czech Republic. In some rural area of Greece it is even 89.8% *(11, 23, 24, 25, 26, 27)*. Awareness 76.7% in our study could be attributed to free access to health care system in Croatia, but still is not very high as in rural parts of Greece where primary care is well established and there are doctors responsible for specific population *(11)*.

According to the results all patients aware of hypertension were treated. High proportion of treated aware participants indicates attitude of doctors, who seem to prefer early medicament treatment of hypertension same as in some other research *(11)*. However, only 39.2% of participants were advised by their physician on harmful effect of high salt intake, in every day meal, on BP and health. This is certainly loss for both patients and system because salt reduction is good non-pharmaceutical treatment available and easy to follow. Also this should be observed through prism of medicine expenditure which is in Croatia more than 120 million of Euro per year per medicine for CVD only. According to the medicine classification (ATC anatomic-therapeutic-chemical classification) in 2009 in Croatia most used were products from the group C (for CVD) with 324.25 defined daily dosages per 1000 patients per day (ddd/1000/day). Among 50 most used medicine for in hospital, and 30 most used for outpatient treatment, first rank holds amlodipin, and within first 10 medicines 4 are for lowering BP (*28*). SMC spends close to 5 million Euros for CVD medicines only using 309.22 ddd/1000/day, out of 16 million Euros, that is overall medicine expenditure per year *(28)*. Measures of primary prevention should be performed continuously and adjusted to special population subgroups as stated before *(20)*.

Success of treatment of BP is at least 18.9 % which is less, but similar and comparable with results from the studies in Romania and Czech Republic *(24, 27)*. Results from BP – CARE study, conducted in Central and East European Countries (Albania, Belarus, Bosnia, Czech Republic, Latvia, Romania, Serbia, Slovakia, Ukraine) show that BP was controlled in 27.1% of treated hypertensive persons *(29)*.

Estimated salt intake was high in all enrolled participants. Estimation of salt intake was made based on the questionnaire, and further analyses of sodium intake based on urinary sodium excretion are necessary. In most developed countries, a reduction in salt intake can be achieved by a gradual and sustained reduction in the amount of salt added to foods by the food industry. Several countries have already reduced salt intake, Japan, Finland and the United Kingdom *(30)*. Large fall sodium intake was noted only in Japan, for the most countries where various programs were implemented the mean sodium intake have not changed markedly over the past 20 years *(31)*. Participants in our study mostly consume food prepared at home, and majority of them were aware that salt intake is related to hypertension same as in some other studies *(32),* but did not know main sources of salt intake in every day meal. Few of

them listed cured meat and snacks. Other studies of rural population in Croatia inquiring about sources of salt intake revealed that more than 50% of both men and women think it is cured meat, only 0.5% recognizes bread as source of salt *(32)*. It is true that public health programs should encourage consumers to use less salt in preparing and consuming, but on the other hand they should be aware what is possible in certain regions. In ASSC areas without possibility to buy food people rely on what they can grow. Their diet is mostly meat, conserved traditionally with salt, for long periods of shelf life due to the fact that even electricity is not available continuously. In that way we can explain that majority of participants considered their salt intake as normal. In the area which is suitable mostly for animal husbandry vegetable and grain is grown for household use only, which in general makes diet without variety. Once a week, or less, mobile shop (truck with food) comes to the villages selling canned goods and bread which are again saturated with salt *(33)*. In such a condition it is difficult to follow the recommendations for low salt intake, and population should be approached in different manner, with recommendations that are suitable for their economic capacity. As for the food industry in Croatia there should be stronger incentives for the salt reduction supported by Croatian agency for food. Within the National programme for the salt intake reduction there were initiative of not offering salt at the tables in restaurants, but until today authors noted this practice only in few pizza restaurants.

Main income in this population are pensions which are between 70 and 140 Euro, some live on social welfare, and some without any income. All inhabitants are entitled by law on free health care, and they are registered with primary care physician, but the fact that there is no transportation makes this care hard to access. Closest health care center is at 13 km distance, and they can use school bus, when weather conditions allow it. Price of the transportation cannot be compensated because it is inside the limit of 30 km which is minimum for compensation, so even if they consult doctor they are not in the position to buy any additional medicines, go to the therapy or systematic examinations. Usually they take additional supply of medicines, or someone else takes them for them. Also, this is the reason why they do not visit dentists. In order to have efficient and affordable healthcare in such a situation some exceptions in the health care organizations should be made. Sometimes change of paradigm is necessary for example one physician should be responsible for one region or for one group of the villages. Similar practice for the isolated and rural population introduced is in Greece where one physician is taking care of one age group given the fact that most of the people have same or similar problems *(11)*. Comunity/public health nurses in Croatia have very broad and not well defined scope of responsibilities and no influence on decision making *(34),* but in many cases they are the only connection to health care system. Maybe their role should be expanded in terms of care and prevention, and narrowed in terms of number of people or region. Certain villages still have community centers which could serve as meeting points with doctors or nurses. Defined time and place of doctor/nurse visit would economize visits and facilitate communication in order to get to know the population in its living and working environment. It is described that in the preventive programs particularly for CVD many barriers exists within the health care system in Croatia that are due to the responsibility distribution and task implementation, and incompatibility of existing practice in clinical medicine and public health *(34)*. Authors argue that among three different reasons the most important is to provide equity in health.

Extremely high prevalence of hypertension, high salt intake, and unsatisfactory knowledge on salt intake should attract attention of national and local public health authorities to apply proper measures. Despite satisfactory rates of awareness and treatment of hypertension, control of hypertension is very low. Physicians should be more aggressive in emphasizing reducing of salt intake in every day meal.

In the end one may ask why it is necessary to invest so much in such a small communities that are already half way to extinction. Model that we witness in ASSC areas is present in the other parts of Croatia as well, leaving many areas without permanent inhabitants. In terms of economic sustainability this could be loss for a state without important product industry, that relies on tourism as the main source of income. Majority of the rural areas in Croatia are considered ecologically unpolluted and therefore suitable for safe food production. SMC is particularly suitable for animal husbandry. In terms of demographic sustainability although trend of urbanization is present in whole Europe and projections are that in 2030 80.5% of population will live in urban settings *(35)* in many cases urban settings do not offer satisfactory quality of life.

In order to maintain life and production in rural settings good infrastructure must be provided with affordable and assessable health care system, adjusted to population needs.

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