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## **Izdavač**

Naučni institut za ratarstvo i povrtarstvo, Novi Sad

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## Nutritive risk factors within population

Mirjana PAVLOVIĆ, Vera GRUJIĆ, Branka LEGETIĆ,  
S. NEDELJKOVIĆ, Nada M. SIGHN, Žužana BOLITŠ,  
Draginja RAPIĆ

### INTRODUCTION

Healthy nutrition satisfies adequate energy and nutrient intake of macro and micronutrients and insures body, growth, development and health. The unhealthy dietary patterns and inadequate choice of food contribute to malnutrition. (1) Asses to a safe and healthy variety of food as a fundamental right, was stressed by the International Conference on Nutrition 1992 and the World Food Summit 1996. A Supply of nutritious and safe food is a prerequisite, of health protection and promotion and the fundamental right of everyone to be free from hunger. (2) According to WHO/FAO one third of world population have malnutrition as iodine deficiency disorders (IDD), iron deficiency anemia (IDA), vitamin A deficiency and around 800 million are chronically hungry. Based on WHO Global Database on Child Growth and malnutrition it is estimated that about 27.8% (169.5 million) of children under 5 years of age in all WHO regions are underweight, about 34.9% (213.1 million) are stunted, and 8.4% (50.2 million) are wasted. (3) The prevalence of obesity is up to 20-30% in adults with escalating trends in last 10 years in Europe for 10-40% increasing the risk of cardiovascular diseases, certain cancers and diabetes. (4) The prevalence of childhood obesity is highest in Eastern European countries with lower rates in Northern countries in Europe (under 5 year 1-4%, 7-11 year 2-23%, 12-18 years 2-29%). (5) Cardiovascular diseases, cancer and diabetes account for about 30% of yearly lost of Disability Adjusted Life Years (DALYs). In countries of European union 9.6% of DALYs lost due- poor nutrition and physical inactivity, 4.5% of DALYs due to poor nutrition, 3.7% due to obesity and 1.4% of DALYs due to physical inactivity. This data can confirm the importance of nutrition as social, health and economic category because of diet-nutrition related illness and its cost to society and health services. Around one third of CVD, the first cause of death in the Region, is related to unbalanced nutrition, and 30-40% of cancers could be prevented through better diet. (6)

### METHODOLOGY

Representative sample of 1318 families of 10 years old schoolchildren have been chosen for cross-sectional analyses of family diet through a Food Consumption Questionnaire during 7 days in February – March 1998. It was a part of prospective National Study "Precursors of atherosclerosis in schoolchildren aged 10-15" – PASCs. Data were elaborated using software "NUTQ". Risk factors in PASCs are observed in 2989 boys and 2845 girls. These centers from national study are: Arilje,

Beograd, Gradište (Republika Srpska), Despotovac, Zajecar, Kraljevo, Knjaževac, Priština, Podgorica, Užice, Niš, Požarevac and Subotica. As the part of the pilot subproject: "Health Condition, Health Needs and Utilization of Health Care by the population of Serbia", representative samples of schoolchildren (n=863) aged 10-18 and adults (n=740) have been chosen. Subproject was observed in North Backa District during November 1998. All the examinees were asked about nutritional habits through the questionnaire, also anthropometrical, biochemical and physiological parameters were obtained. By statistical processing (software SPSS) we have determined percentage division of examinee frequency for the whole sample and in subgroups according to sex, place of living and age. CVD risk factors frequency was evaluated according to referent values for body mass index, systolic and diastolic artery tension, total cholesterol, LDL-cholesterol, HDL-cholesterol and triglycerides. Since 1996, during the obligatory systematic examination of youth in Subotica we followed the nutritional status, dietary patterns and lifestyle. Data were statistically evaluated by software "Youth". The quality of social nutrition of different categories of population systematically was evaluated by chemical bromathological analysis using software "Analysis of meals". National Project "Health, health needs, and Utilization of Health Care in the population of Serbia" was observed in 2000 on representative sample of adults (n=9526). In all the examinees were made evaluation of nutritional status according to BMI, dietary patterns by questionnaire and statistical processing using SPSS program. Growth, development and nutritional status of children under 5 in Yugoslavia was observed during 2000 and evaluation according to NCHS/WHO standards.

## RESULTS

In PASCs study mean daily intake of familial nutrition in children aged 10 is 2981,87 kcal. Percentage supply of different food groups in daily energy was as it follows: bread, grains and cereals contributed with 33,79%, milk and products with 10,19%, meat, eggs and meat products with 15,08%, fish 1,04%, vegetable and products 4,51%, fruit and products 7,85%, fat and oil 13,35%, sugar and sweets 8,35% (table 1). Average daily intake of cholesterol is 226,69 mg (76,01mg/1000 kcal). Average percentage supply of saturated fatty acid in total daily energy is 11,35% and polyunsaturated fatty acids 17,52%. Proteins made 14,76%, total fat 40,08% and carbohydrates 45,16% of total energy. Daily intake of dietary fibers was 16,46g/day (5,51g/1000 kcal) (Table 2) (7). Average daily intake of vitamins and minerals was mainly below RDA references for children aged 7-10, especially the nutritive selenium (99%), vitamin A (99%), zinc (34%), vitamin D (99%), vitamin K (57,3%), iodine (37%) and calcium (15%). Nutritive risk factors were established in scope of increased fat intake > 30% energy at 67% of families, free sugars >10% energy value at 60% families, SFA > 10% e.v. at 53% of families, cholesterol >300 mg/day at 20% families, PUFA/SFA ratio <0,45 at 74%, while at all the families the salt content was increased (>6g/day) and dietary fibers content was decreased (<20g/day).

Tab. 1. - Mean daily intake of some food groups in familial nutrition of schoolchildren in all centers of \* JUSAD survey during 1998 (per caput)

Food group	g/day	% of total energy	kg/year
Milk and products	316,42	10,19	115,49
Meat, eggs and products	197,49	15,08	72,08
Fish and products	26,87	1,04	9,81
Bread and grains	364,78	33,79	133,14
Vegetable and products	307,19	4,51	112,12
Fruits and products	403,20	7,85	147,17
Sugar and sweets	69,07	8,35	25,21
Fat and oils	49,45	13,35	18,05
Nuts	14,08	2,81	5,14
Legumes	15,76	1,64	5,75
Beverages-alcohol, tea, coffee	53,69	1,28	19,60
Spices	6,11	0,10	2,23
<b>TOTAL</b>	<b>1824,11</b>	<b>100,00</b>	<b>665,799</b>

Tab. 2. - Average daily energy and macronutrient intake in familial nutrition of schoolchildren in all centers of JUSAD survey during 1998 (per caput)

Energy/nutrient	Day	1000Kcal	% of total energy
Energy value (Kcal)	2981,96	-	-
Total fat (g)	128,53	43,10	40,08
- animal (A) (g)	74,87	25,11	23,35
- vegetable (V) (g)	53,66	17,99	16,73
Total proteins (g)	107,42	36,02	14,76
- animal (A) (g)	58,16	19,50	7,99
- vegetable (V) (g)	49,26	16,52	6,77
Carbohydrates (g)	328,45	110,15	45,16
Saturated fatty acid (S) (g)	36,38	12,20	11,35
Polyunsatur.fatty acids (P) (g)	56,20	18,85	17,52
Monounsatur.fatty acids (M)(g)	35,95	12,05	11,21
Cholesterol (mg)	226,69	76,01	-
Dietary fiber (g)	16,46	5,51	-
- fiber soluble(g)	8,00	2,68	-
- fiber insoluble (g)	8,46	2,83	-
<b>Total:</b>	<b>Average ratio P/S=1.54; A/V fat=1,39; A/Vprotein=1,18</b>		

(7,8) In the course of PASCs study, hypercholesterolemia (>5,2 mmol/l) was determined at 11,94% of boys and 13,53% of girls, low values of HDL-cholesterol (<1,2 mmol/l) at 23,59-27,45% boys and girls, high values of LDL-cholesterol (>3,01 mmol/l) of 27,87-31,11%, hypertriglyceridemia (0,92 mmol/l) was determined in 21,95- 27,45% boys and girls. Overweight was found in 12,57% boys and 10,10% girls, and obesity in 8,33% boys and 7,16% girls. (8). Moderate underweight (BMI P5-15) was determined in 8.45 - 11.11% of children,

underweight (BMI  $P < 5$ ) in 5.3 - 9.11% of them, and anemia (Hb  $< 120$  g/L) in 21.95 - 24.0% of boys and girls. Potential nutritive risk factors in schoolchildren aged 10-18 in North Backa District are connected with inadequate rhythm of meal consumption and irregular food selection. About 24% of schoolchildren skip the breakfast, while only 43% of examinees consume fresh fruit everyday and 21% vegetable. Snacks are supplied in everyday nutrition in 28,5% of children, non-alcoholic beverages in 39% of children, 15,6% add salt in their meals regularly. The important fact is that only 23,4% of children think about health in food choice and just 37,2% want the changes in their nutritional habits. (9,10) Physical inactivity occurs in 19% of children, 12% are occasional alcohol consumers, 7% smoke every day and 12% are exposed to second -hand smoke for more than 5 hours/day. Analyzing the distribution of risk values of lipid parameters in schoolchildren 10-18 years old in North Backa District, we determined hypercholesterolemia in 11,9% of schoolchildren (10,7% boys; 13,2% girls), low values of HDL cholesterol in 16,0% (18,7% - 14,2% boys and girls), elevated values of LDL-cholesterol in 21,7% schoolchildren (18,7% - 24,8% boys and girls), high values of atherosclerosis index in 21,9% (21,5% - 22,4% boys and girls). Hypertriglyceridemia was determined in 30,4% of schoolchildren, 28,1% boys and 33,0% girls. Overweight and obesity are determined in 13,80% of boys and 13,50% of girls, while systolic hypertension in 6.10-7.50% of schoolchildren, underweight (BMI  $< P15$ ) in 19.3 - 21.0% of children, anemia in 8.2 - 16.4% of them. (9, 10, 11) Most of the main CVD risk factors occur frequently in adults in North Backa Region, like obesity in 33,5 – 41,3% women and men, extreme obesity in 21,6 – 32,0% men and women, border line values of total cholesterol in 32,10 – 35,6% adult inhabitants and high values in 40,8 – 48,2%. Risk values of triglycerides were determined in 46,2 – 51,4% of adult population, significant hypertension in 30,3 – 32,3%, severe hypertension in 24,6 – 29,5% men and women (Table 3).

Tab. 3. - Frequency of obesity, lipid parameters risk values and hypertension in adults in North Backa district

	Male	Female
Obesity (BMI 25-39.9)	41.3%	33.5%
Extreme obesity BMI >40	21.6%	32.0%
Cholesterol		
-Border line values 5.2 -6.4 mmol/l	35.6%	32.1%
-High values > 6.4	40.8%	48.2%
Triglycerides		
- Risk values >1.7 mmol/l	51.4%	46.2%
Border line hypertension (141-159 mmHg)	30.3%	32.3%
Hypertension >160 mmHg	24.6%	29.5%

Physical inactivity occurs in 58.0% of adults, smoking habit in 33.9%, everyday alcohol consumption 4.9%, and occasional in 44% of population. Analyzing the number of risk factors and their corresponding, it was found that without risk factors there are 11.6% inhabitants, with one risk factor 31.7%, with two 28.5%, three 17.2% four or more 10.7% of adults. Incorrect nutrition poor with fruits (38% every

day) and vegetable (36.5% everyday) is present, 12.2% adults add salt in their meals, white bread is used by 73.2% of adult inhabitants, 36% skip the breakfast and only 35.7% of the population want to change own dietary patterns. (7,9) Analyzing the nutritional status of youth in Subotica (n=886) underweight (BMI<20) was established in 25.03% of them, normal body weight (BMI 20-25) in 55,81%, overweight (BMI 25-30) in 14.99% obesity (BMI>30) in 4.17%, systolic hypertension in 3.34% and diastolic hypertension in 1.62%. Elevated values of total cholesterol (>5,2 mmol/L) we determined in 21.69% hypertriglyceridaemia (>1,7 mmol/L) in 20.4% of them. In the group with borderline and risk values of cholesterol and triglycerides we found 39.53% with low HDL-cholesterol (<1,7 mmol/L) and 44.77% with high LDL-cholesterol (>3,4 mmol/L). There were 23.3% of youth with high values of index of atherosclerosis, and 37.63% with elevated values of established risk factor. More than 60% of examines added salt in their meals, while about 20% ate fatty foods, every day consume alcohol 3.15% and sometimes 64.79% of youth. (12) According to chemical-bromathological analyses, mean energy values of social nutrition meals were mostly in proportion with dietary references for different categories, respectively for age and energy expenditure. Exception was the category of preschoolchildren in Subotica, where the energy value of meals is deficient and still decreases. The average participation of proteins in chemical composition of meals is about 15 to 18 %, fats 30 to 40%, carbohydrates 45 to 52% and salt 6-15 g.(8) The prevalence of overweight (BMI 25-30) in adult population in Vojvodina was 35.5% in Central Serbia in 37.7% and 36.6% in Serbia, while the obesity (BMI>30) was established in 23.0% in Vojvodina, 16.1% in Cental Serbia and 17.3% in Serbia. Normal nutritional status (BMI 20-25) was registered only in 34.1% of examinees in Vojvodina, 39.7% in Central Serbia and in 38.6% in Serbia. Underweight (BMI<20) was established in 7.3% in Vojvodina, 6.9% in Central Serbia and 7.4% in Serbia. (13) (Table 4)

Tab. 4. - Nutritional status of adult population in Serbia

	BMI < 20	BMI 20 - 25	BMI 25 - 30	BMI > 30
Vojvodina	7,3 %	34,1 %	35.5%	23.0%
Central Serbia	6,9 %	39,7 %	37.7%	16.1%
Serbia - total	7,4 %	38,6 %	36.6%	17.3%

Based on nutrition questionnaire 28.1% of population in Serbia skip the breakfast always or sometimes, everyday consume 1-2 cup of milk 43.8%, fresh fruit 43.7%, vegetable 48.3%, pork meat 1-2 times per week 49.2%, fried potato 86.6%, 3-7 eggs per week 47.7%, white bread in used by 82.9%, pork fat by 40.5%, while 58.1% adults add salt in their meals, and only 13% of population think about health in food selection. Everyday consumption of vegetables was established more in population in Central Serbia (48.3%), than in Vojvodina (36.3%) while the fruit in Central Serbia (39.9%) and Vojvodina (27.4%). The population in Vojvodina use pork fat in food preparation in 50.5% and in Central Serbia 43.4%, while the vegetable oil is used more in Central Serbia (53.1%) than in Vojvodina (45.2%). (13) In 2000 the

prevalence of malnutrition in children under 5 in Yugoslavia had all increased in compare to 1996. The prevalence of moderate and severe underweight had risen from 0.5 to 1.9%. Moderate and severe wasting had risen from 1.7 to 3.7%, stunting from 2.1 to 5.1%. Overweight increased from 12.9% to 14.3%. In 1996. on World Summit for Children the 3. goal of Declaration was set up as reduction of severe and moderate malnutrition under 5 by half between 1990. and the year 2000. In our country data from 1990. not available and therefore we compare with results in 1996.(14)

## DISCUSSION

Inadequate supply of certain food groups in family nutrition may present potential nutritive risk factor. Participation of fruit and products (7.85%) and vegetables and products (4.51%) are below the recommendations that are 10-15% and 15-25%. Bread and grains supply is on borderline – 33.79%, while meat and products make 20.57%, fats, oils and sugars 21.7% what is far above references that are 10% and 5%. This type of percentage supply of food groups in familial nutrition may be the cause of high frequency of nutritive risk factors like sufficiency or deficiency of nutritive elements. (1,6) Inadequate nutrition habits and lifestyle are mostly acquired in childhood and settled in adolescence. From that reason, WHO conducted the study in 1997/98 among 123227 schoolchildren, aged 11,13 and 15 from 28 countries. It was determined that 13 years old children consume fruit everyday considerably in Portugal (92-93%), Poland (82-85%), Czech Republic (81-85%), and rarely in Greenland (31-38%) and Belgium (46-48%). Snacks are consumed everyday in 13 years old children in North Ireland (41-51%), Scotland (36-44%) and the least in Norway (1-3%) and Sweden (2-3%). Regarding the consumption of sweet non-alcoholic beverages, it is the most frequent in North Ireland (75-79%), Israel (65-76%), and the least frequent in Finland (9-19%) and Sweden (15-28%).(15) In another International study the frequency of hypercholesterolemia in boys and girls aged 13 was presented ( $TC > 4.65$  mmol/l). Fifteen countries were participants in the study and the highest values of total cholesterol were found in children from Finland (69% boys and 70% girls), Norway (52% both sexes), West Germany (47-45% boys and girls), Kuwait (50-28%), Netherlands (42-36%), Thailand (35-46%), Kenya (29-24%), USA (16-19%), and the lowest values in Japan (13-18%), Greece (10-9%), Nigeria (9-13%). (1) EURALIM (Europe Alimentation) is study that examines nutrition and lifestyle in 7 European centers ( $n=31289$ , 18381 female and 12908 male aged 40-59). Study takes place in France, Netherlands, North Ireland – Belfast (UK), Spain – Catalonia, Swiss-Geneva, Italy – Latino and Napoli. It is determined that the dominant risk factors in Europe's adult population are: hypercholesterolemia, hypertension, smoking habit, obesity and inadequate nutrition regarding deficiency in fruit and vegetables. Results show sufficiency in average participation of total fat 35% of daily energy intake. Carbohydrates make less than 45% and proteins more than 15% of total energy. Consumption, frequency of fruit and vegetables is decreased, especially in males in all the examined centers. Insufficient intake of fruit is the quantity or 1 of ½ portions

or less, for vegetables ½ portions or less (without potato intake). Population of Catalonia is the greatest consumers of fruit and vegetable food, while people in Netherlands consume the least (67-98%). Correlation between lower level of education and rare consumption of fruit was found only in France. It is also determined that smokers consume less fruit than non-smokers, except in Catalonia and Latino. (16) Results of EURALIM show the connection between dietary patterns and CVD risk factors. Also, the prevalence of risk values of blood cholesterol (5.2 mmol/l – 6.5 mmol/l) is higher in males than females, the highest values are found in France (46-48%) and the lowest in Geneva (40-41%). Hypercholesterolemia (TC>6.5 mmol/l) is the most frequent in Belfast (UK) (37-38%), and the least frequent in Catalonia (15-18%). Systolic hypertension (STA>160mmHg) is the most frequent in Latino, Italy (27-35%) and the least in Geneva (8-15%). Prevalence of overweight (BMI = 25-30 kg/m<sup>2</sup>) is the highest in Latino, Italy (42-057%) and the lowest in Geneva (21-42%) and France (19-43%), while obesity (BMI>30 kg/m<sup>2</sup>) was mostly found in Latino (20-37%) and the least in France (7-8%). (16) World health Organization proclaimed for member States a document "Health 21" 21 targets for 21st century, and proposed a Food and Nutrition Action plan for Europe 2000-2005. The document stresses the need to develop food and nutrition policies which protect and promote health and reduce the burden of food and nutrition related diseases. (23) Nutrition and diet for Healthy lifestyle in Europe proposed in "Population goals" in "Eurodiet" for prevention of most important health problems. (17)

## CONCLUSION

Presented characteristic of population nutrition present a potential nutritive risk factors for chronic non-communicable diseases and malnutrition

The high prevalence of inadequate nutritional status as underweight, anemia, wasted, stunted, obesity, hypertension and hyperlipoprotheinemia with incorrect life stile was determined in children, youth and adult population.

The quality of nutrition and nutritive risk factors points out the necessity of prompt preventive measures like continually monitoring, early detection, intervention and treatment in order to improve nutrition and health of population.

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