

CURRENT TRENDS
OF THE PREVENTION
OF ATHEROSCLEROSIS
IN CHILDHOOD 3

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NUTRIENT INTAKE AND PRECURSORS OF ATHEROSCLEROSIS IN 10 YEAR OLD SCHOOLCHILDREN IN SUBOTICA

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Cardiovascular disease (CVD) in our region take the first place in the structure of the general mortality with about 60% and with 19% the second place in general morbidity.

Unbalanced family and social nutrition with incorrect life style can be associated with high incidence of majority CVD risk factors in adult population, youth and children in Subotica. In adult population we registered Obesity (BMI over 25) in 50–55%, hypertension (over 18.7 / 12.3 kPa) in 18%, hypercholesterolemia (TC > 5,2 mmol/l) in 80.0–84.1%, hypertriglyceridemia (TG over 1.70 mmol/l) in 41.2–50.7%, diabetes in 7% of population.¹ At obligatory general check up of the male aged 17–24 in Subotica 19.43% were with BMI over 25, systolic hypertension were found in 3.6%, hypercholesterolemia in 21.70%, hypertriglyceridemia in 20.40%, low HDL-C in 39.52% and high LDL-C in 44.76% of them.²

Epidemiological studies demonstrate the positive correlation between morbidity and mortality of CVD in adult with early atherosclerosis lesion and risk factors level in children, adolescents and adults.³

Majority risk factors are in connection with eating and lifestyle patterns already adapted in childhood and youth.^{3,4}

The aim of this study has been to determine the quality of family nutrition in schoolchildren, the nutritive risk factors and their distribution, the type and distribution of precursors of atherosclerosis.

This study has been taken in the period of January–March 1998, as a part of Yugoslav Study “Precursors of atherosclerosis in schoolchildren at the age 10–15 years (PASCS)” — International Prospective Study, where Subotica presents one of the Regional centers.

A representative sample of 492 schoolchildren from III grade of five elementary school (270 boys and 222 girls aged 9 and 10) have been covered by cross-sectional analyses of the atherosclerosis precursors. Obesity was marked, over P85 of body mass index (BMI kg/m²) and hypertension determined SBP = systolic blood pressure and or the DBP = diastolic blood pres-

sure) over P95.^{5,6} The following lipid parameters were determined: serum total cholesterol (TC), HDL-cholesterol (HDL-C), triglycerides (TG), LDL-cholesterol (LDL-C) and the frequency of some lipid risk factors was determined according to our national reference values.^{7,8}

A 7 day food records of food consumption by questionnaire were used for evaluation of energy and nutrient intake in family nutrition ($n = 357$ families of schoolchildren). Evaluation has been done by computerized food data base "NUTQ", and nutritive risk factors according to RDA index of dietary adequacy, as well as Population Nutrition Goals.⁹⁻¹¹

Evaluation of food intake questionnaire by computer program "NUTQ", mean energy intake in family nutrition was 2197.87 Kcal, where the proteins were represented with 14.64%, fats with 39.59% and carbohydrates with 46.78% (Table 1).

Dietary composition shows that 24.32% of energy comes from animal fat, 15.27% vegetable fat, 8.42% from animal and 6.22% from vegetable protein. Fatty acid composition was for saturated fat 11.17% of energy and 7.52% from polyunsaturated (Table 1).

Analysing the percentage supply of different food groups in daily energy, bread, grains and cereals contributed with 32.32%, milk and products

Table 1
Average daily energy and macronutrient intake
in family nutrition of schoolchildren in Subotica

Energy/Nutrient	Mean intake/ day	Mean intake/ 1000 Kcal	% of total energy
Energy value (Kcal)	2197.87		
Total fat (g)	97.82	44.51	39.59
- animal (A) (g)	60.10	27.34	24.32
- vegetable (V) (g)	37.72	17.16	15.27
Total protein (g)	82.51	37.54	14.64
- animal (A) (g)	47.65	21.68	8.42
- vegetable (V) (g)	34.86	15.86	6.22
Carbohydrates (g)	256.58	116.74	46.78
Saturated fatty acids (s) (g)	26.41	12.01	11.17
Polyunsaturated fatty acids (p) (g)	17.77	8.08	7.52
Monounsaturated fatty acids (g)	23.50	10.69	9.94
Cholesterol (mg)	181.72	82.68	
Dietary fiber (g)	10.67	4.84	
Fiber soluble (g)	4.97	2.25	
Fiber insoluble (g)	5.70	2.59	

Average ratio P/S = 0.67; A/V fat = 1.59; A/V protein = 1.36

with 9.97%, meat, eggs and meat products 18.89%, fish only 0.91%, fat and oil 12.57%, sugar and sweet 7.76%, vegetables and products 4.95%, fruit and products 7.14%, legumes 1.55%, nuts 2.64% (Table 2).

Table 2
Mean daily intake of some food group in family nutrition of schoolchildren in Subotica (Per caput)

Food group	Mean intake g/day	% of total energy	Mean intake kg/year
Milk and products	253.83	9.97	92.648
Meat, eggs and meat products	175.16	18.89	63.933
Fish and products	15.92	0.91	5.809
Bread and grains	254.77	32.32	92.989
Vegetables and products	211.51	4.95	77.199
Fruit and products	279.75	7.14	102.109
Sugar and sweets	46.66	7.76	17.030
Fat and oils	34.84	12.57	12.717
Nuts	9.81	2.64	3.579
Legumes	10.98	1.55	4.009
Beverages (alcoholic, tea, coffe)	40.17	1.17	14.661
Spices	5.83	0.12	2.127
Total	1339.22	100	488.816

Mean intake of dietary cholesterol was 181.72 mg and 82.68 mg/1000 Kcal, and dietary fiber 10.67 g/day (4.84 g/1000 Kcal). Analytical questionnaire of schoolchildren's family nutrition shows that about 75.07% take in more than 30% fat, 65.27% of them over 10% refined sugar, and 50.42% of them over 10% of saturated fatty acids considering their daily energy diet. Daily intake of salt over 6 g and dietary fibers < 20 g/day has been determined in all families (100%). Cholesterol intake over 300 mg/day was found in 7.0%, and P/S ratio less than 0.45 in 70.03% of them (Figure 1).

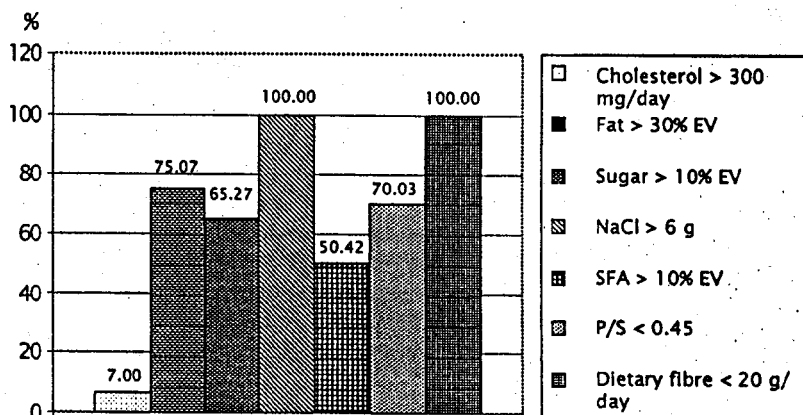
Comparing average energy and nutrient intake with RDA for age 7-10 year there were more families below of RDA. Less than 90% of RDA was determined for energy in 33.89% of them, protein 3.6%, calcium 33.89%, iron 8.4%, iodine 43.6%, selenium 82.9%; zinc 65.26%, vitamin A 94.1%, vitamin D 97.0%, K-vitamin 71.4%, B₁ vitamin 3.08%, B₂ vitamin 4.2%, vitamin B₆ 23.24%, vitamin B₁₂ in 4.48%, C-vitamin in 8.4% (Figure 2).

Analyzing distribution of schoolchildren according to NHANES I we found 17.47-22.94% boys and girls with BMI < P15, with BMI P15-85 were 59.17-63.94% of girls and boys, overweight were 10.004-11.47% of them and obese 6.42-8.55% of girls and boys (Table 3).

Figure 1

Frequency of nutritive risk factors in family nutrition of schoolchildren in Subotica

(Population Nutrition Goals, Technical Report Series 797, Geneva 1990)



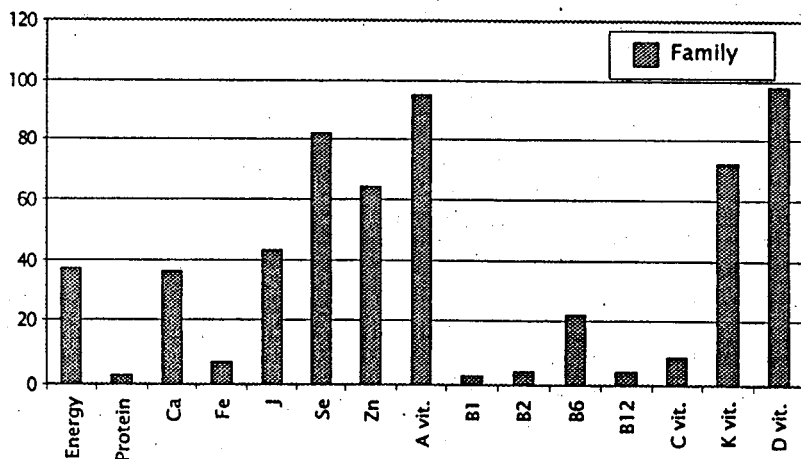
Note: EV = energy value, SFA = saturated fatty acids, P/S = ratio polyunsaturated to saturated fatty acids

Table 3
Nutritional status of schoolchildren in Subotica according to BMI (kg/m^2) NHANES I

Age (Year)	Sex	Total	Body mass index BMI (kg/m^2)							
			<= P15		P15-P85		P85-P95		> P95	
		n	n	%	n	%	n	%	n	%
9	boys	105	13	12.38	68	64.76	15	14.29	9	8.57
	girls	97	24	24.74	51	52.58	15	15.46	7	7.22
10	boys	164	34	20.73	104	63.41	12	7.32	14	8.54
	girls	121	26	21.49	78	64.46	10	8.26	7	5.79
Total	boys	269	47	17.47	172	63.94	27	10.04	23	8.55
	girls	218	50	22.94	129	59.17	25	11.47	14	6.42

Figure 2

Frequency of families with deficit of some nutrients according to RDA for children age 7-10 year (<90% RDA)



Severe systolic hypertension was determined in 7.66–8.15% girls and boys (Table 4). Hypercholesterolemia was found in 6.58–11.65% boys and girls, hypertriglyceridemia in 11.93–17.67% of them, low HDL-C in 9.47–21.69% of them, high values of LDL-C in 14.40–20.08% of children, elevated IA in 11.93–20.08% of boys and girls, and elevated ERF in 7.82–15.66% of boys and girls (Table 5, Figure 3).

Analyzing all mentioned risk factors in schoolchildren we determined that there are 46.14% without risk factor, 25.41% of them with one, 14.85% with two, 8.74% with three and 4.87% of them with four and more risk factors. Combination of obesity, systolic hypertension (> P95) and elevated LDL-C, were found in 1.42% of children, and with > LDL-C and < HDL-C in 2.64% of children (Figure 4).

Relatively great number of children even at this age in our area have one or more risk factors that are directly connected with the unbalanced diet and incorrect life style.

The average child's diet in our region is relatively high in total fat, saturated fatty acids, cholesterol, free sugars, salt and low in vegetables, fruit, dietary fibers, P/S ratio, majority minerals and vitamins. Therefore it can play a potential atherosclerosis risk factor in schoolchildren beside other risk factor.

Table 4
Distribution of systolic hypertension in schoolchildren in Subotica

Age (year)	Normal blood pressure				Significant hypertension				Severe hypertension			
	Boys		Girls		Boys		Girls		Boys		Girls	
	n	%	n	%	n	%	n	%	n	%	n	%
9	94	89.52	87	90.63	-	-	-	-	12	10.48	9	9.38
10	154	93.75	116	91.80	-	-	2	1.64	10	6.25	8	6.56
Total	248	91.85	203	91.44	-	-	2	0.90	22	8.15	17	7.66

Table 5
Frequency of lipid risk factors in schoolchildren in Subotica

	TC > 5.2 mmol/l		TG > 0.92 mmol/l		HDL-C < 1.20 mmol/l		LDL-C > 3.01 mmol/l		IA > 2.24		ERF > 3.70	
	n	%	n	%	n	%	n	%	n	%	n	%
Boys	16	6.58	29	11.93	23	9.47	35	14.40	29	11.93	19	7.82
Girls	29	11.65	44	17.67	54	21.69	50	20.08	50	20.08	39	15.66
Total	45	9.15	73	14.83	77	15.65	85	17.28	79	16.06	58	11.79

Figure 3
Frequency of the precursors of atherosclerosis in schoolchildren in Subotica

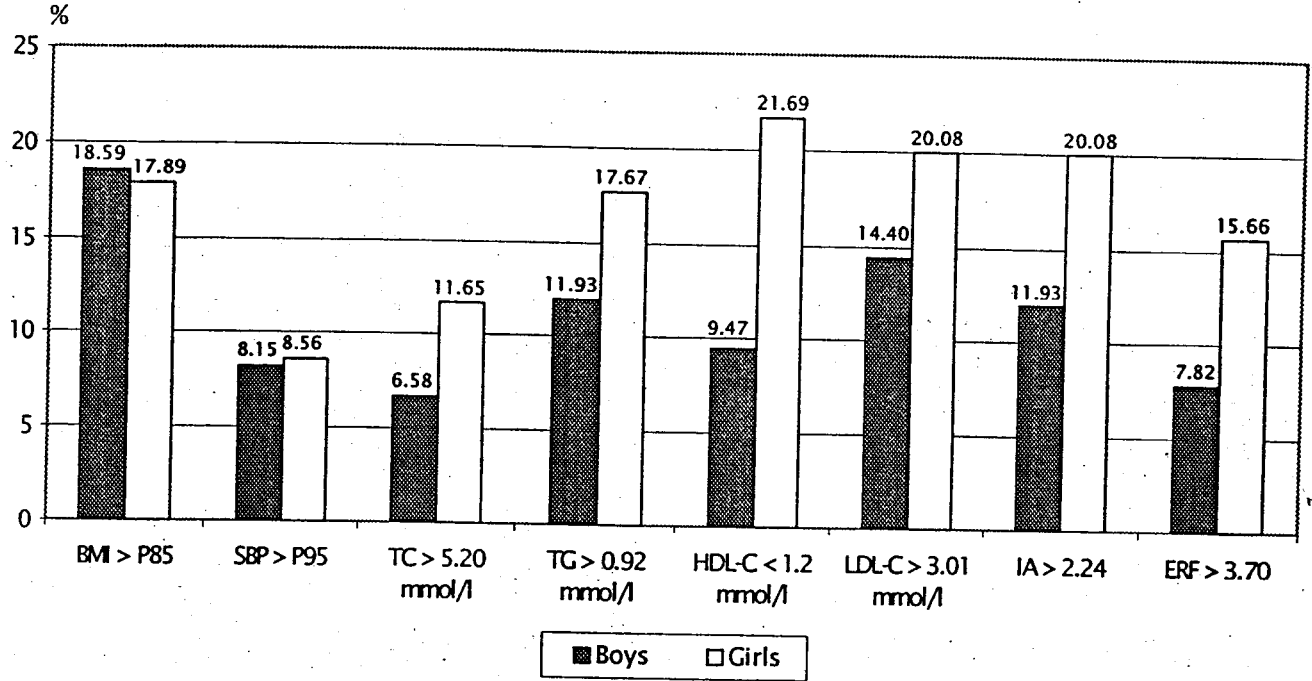
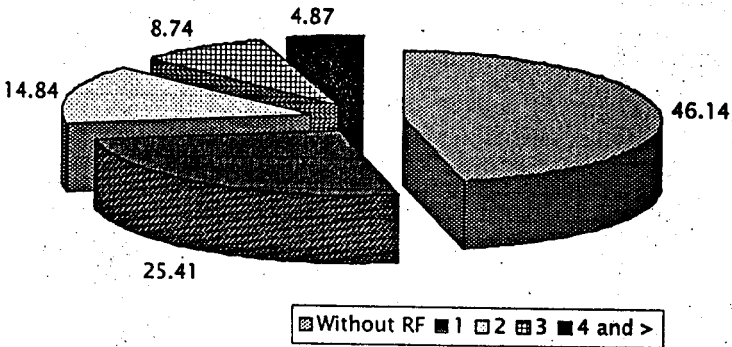


Figure 4
Distribution of schoolchildren with different number
of risk factors



Therefore we have to take prompt preventive measures in order to prevent nutritive disorders on population level. In children with some risk factors we undertake individual preventive measures.

The essence of the reduction and elimination of the risk factors for atherosclerosis and CVD is early detection, constant tests and preventive measures, since the intervention at this age is more efficient.

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