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Diet as a risk factor of cancer among the population of Niš

Maja Nikolić[1], Vladimir Mitrović[1], Nataša Lukić[2], Konstansa Lazarević[1]

[1]University of Niš, School of Medicine, Public Health Institute, Niš, Serbia, [2]Clinical Center of Niš, Oncology Clinic, Niš, Serbia; Address correspondence to: Doc. Dr Maja Nikolić, Public Health Institute, Avenue dr Zoran Đinđić 50, 18000 Niš, Serbia; E-mail: mani@junis.ni.ac.yu; The manuscript was received: 16.06.2006, Provisionally accepted: 20.10.2006, Accepted for publication: 29.10.2006

ABSTRACT

Background: *Objective of the study was to determine the differences in distribution of the most important nutritional risk factors for cancer among healthy population of Niš, men and women, in order to carry out adequate measures of prevention.*

Methods: *388 people were involved in the study, randomly selected and they completed the authorized questionnaire concerning their eating habits, marital status and smoking habits. Body mass index was determinated also. Participants' nutritive profile concerning risk factors was determined by giving points to each factor such as number of daily portions of fruits, vegetables, and cereal, daily intakes of red meat, table salt, and alcohol and obesity. χ^2-test was applied to determine if there is statistically significant difference among risk factors concerning sex and marital status. Student t-test was applied to determine if there is statistically significant difference among medium values of points of risk concerning sex and marital status.*

Results: *According to the results, the population of Niš is at medium risk for cancer. The number of points between 18 and 27 was considered medium risk. Women are at lower risk to develop cancer than men ($t= 6.66$, $p>0.01$), regarding nutritional risk factors, the some for singles ($t = 2.38$, $p>0.01$). Vegetables ($\chi^2 = 3.29$, $p<0.01$) and salt ($\chi^2 = 2.15$, $p<0.01$) intake was not statistically different among men and women, while cereal ($\chi^2 = 10.96$, $p<0.01$), alcohol ($\chi^2 = 13.48$, $p<0.01$), and table salt ($\chi^2 = 29.01$, $p<0.01$), intake was higher among singles. Singles were of heavier weight than married ones ($\chi^2 = 19.66$, $p<0.01$).*

Conclusion: *Prevention of cancer should be based on higher intake of fruit and lower intake of red meat, as well as, giving up smoking and alcohol and regulating weight.*

KEY WORDS: *Neoplasms; Risk Factors; Nutrition; Eating; Diet*

INTRODUCTION

Cancer is now a major cause of mortality throughout the world and, in the developed world, is generally exceeded only by cardiovascular diseases. As developing countries become urbanized, patterns of cancer, including those most strongly associated with diet, tend to shift towards those of economically developed countries (1).

The relationship between dietary components and cancer is not fully established; however, the overall impact of diet on cancer mortality papers to be significant. Evidence that diet is a determinant of cancer risk comes from several sources, including: correlation between national and regional food consumption data and the incidence of cancer in the population; studies on the changing rates of cancer as they migrate from a region or country of one dietary culture to another; case-control studies of dietary habits of individuals with and without cancer; prospective studies; intervention studies (2-5). It has been estimated that 35 percent of cancer deaths may be related to dietary among different cancers or groups of cancers, making diet second only to tobacco as a theoretically preventable cause of cancer. Body weight and physical inactivity together are estimated to account for approximately one-fifth to one-third of several of the most common cancers, specifically cancer of the breast (postmenopausal), colon, endometrium, kidney and esophagus (adenocarcinoma) (6-8).

There are insufficient epidemiological data on risk factors for cancer, useful for the intervention studies in Serbia.

The aim of the study was to obtain epidemiological data on the most important diet risk factors for cancer among the citizens of Niš in order to prevent cancers more adequately and at right time in the future interventionary studies.

PARTICIPANTS AND METHODOLOGY

The participants, all citizens of Niš were invited to take part in the study in 2005. They were chosen randomly from the patients of Primary Health Center waiting for regular survey. Individuals between 18 and 58 years of age who were invited to the health examination received personal information about health dialogue. Those who agreed to participate (126 men and 226 women) completed original structured questionnaire. The health examination was carried out by specially trained physicians at the health centers. The health profile grades 10 generally accepted risk factors for cancer disease according to degree of risk. The intention with the health profile was to evoke an interest for lifestyle among the participants in the dialogue with physicians, and to use it as a base for intervention measures.

The questionnaire included questions about eating habits, alcohol intake and smoking habits. Use of tobacco was calculated as grams of tobacco smoked per day equivalent to cigarettes per day. Alcohol intake was estimated from the general questionnaire and calculated as mean intake of 40% alcohol (cl) per week.

Body height was measured to the nearest cm with the subject standing without shoes. Body weight was measured to the nearest 0.1 kg with the subject wearing light clothes. Body mass index (kg/m2) was calculated after measuring the weight (kg) and height (m) of every participant. The separate factors included in the profile were given 1 to 3 or 1 to 4 risk points as shown in Table 1.

Table 1. Risk factor values that classified participants into risk groups (risk points)

Risk factors	Risk Points			
	1	**2**	**3**	**4**
Daily Fruit Intake (Number of Servings Per Day)	≥5	4 or 3	2	≤1
Daily Vegetable Intake (Number Servings Per Day)	≥5	4 or 3	2	≤1
Daily Raw Cereal Intake (Number of Servings Per Day)	≥3	2	≤1	
Daily Red Meat Intake (g)	≤80	80 - 140	>140	
Type of Alcohol	Bear	Vine	Liquor	Does not drink
Weekly Alcohol Intake (cl) (40% alcohol, 1cl equals 3.16g alc.)	<18	18 - 36	37 -75	>75
Extra Salt	No	0	0	Yes
Daily Salt Intake (g)	<5	5 - 10	10 - 15	≥15
Body Mass Index (kg/m^2) Men	<25	25 - 36	≥37	
Body Mass Index (kg/m^2) Women	<27	27 - 38	≥39	
Smoking (Number of cigarettes per Day)	0	1 - 14	15 - 25	≥25

The aim was to give two risk points if the relative risk of cancer was estimated to be increased by one to two times compared with one risk point, three risk points if the relative risk was estimated to be increased two to three times, and four risk points if the risk was estimated to be increased by more than three times. Body mass index (BMI) is given different grading for men and women. The table was created according to a Swedish health promotional program Live For Life (9). Risk points degrees resulted from previous studies involving the world population. It may be pointed out that the grading was made to give a crude estimation only.

Maximum dietary habit score was found to be in the range from 10 (persons with the lowest risk for the disease) to 36 (the highest risk). Medium risk point value of 24.5±5 represented medium cancer risk due to bad eating habits and smoking.

Unpaired t – tests were used for testing the hypothesis of no difference between mean values of risk points.

Chi-tests were used to compare cancer development risk factors frequency distribution between men and women and singles and married.

The statistical software package SPSS 11.0 for Windows was used in all analyses.

RESULTS AND DISCUSSION

There were no significant age differences among participants (p>0.001). The average age of male individuals was 38.93±19.07 years, and the average age of female individuals was 39.98±18.07 years.

The average risk score imply to a medium cancer risk due to poor diet habits and lifestyle. Women reported better dietary habits, lower total tobacco use, and lower alcohol consumption than men in both ages (Table 2). Marital status is factor shown to be predictive of risk score for cancer and there were significant differences between single and married individuals (Table 3). Method of risk scores is important to define risk level that requires intervention, among the whole population, as well as among individuals. Intervention should be started among endangered groups with the highest numbers of risk points.

Table 2. Statistical significance of the differences in average cancer development risk points in regard to sex

MEN		WOMEN		t	p
n	**X ±SD**	**n**	**X±SD**		
162	21.47±2.78	**226**	19.57±2.75	6.66	<0.01

Table 3. Statistical significance of the differences in average cancer development risk points in regard to marital status

	MARRIED (n=268) (n=268)	SINGLES **(n=120)**	**t**	**p**
X±SD	20.59±2.84	19.84±3.00	2.38	<0.01

Table 4. Risk points distribution (%) in regard to sex and statistical analysis

Risk Factors	**WOMEN n=226**			**MAN n=162**			χ^2	**p**
	1	**2**	**3-4**	**1**	**2**	**3-4**		
Daily Fruit Intake (Number of Servings Per Day)	31.9	46.5	21.7	19.1	54.9	25.9	7.83	<0.0198
Daily Vegetables Intake (Number of Servings Per Day)	73.9	23	3.1	66	24	5.6	3.29	>0.1931
Daily Raw Cereal Intake (Number of Servings Per Day)	9.3	84.1	6.6	1.2	53	45.7	85.77	<0.0001
Daily Red Meat Intake (g)	8.4	20.8	70.8	4.3	9.2	86.5	14.46	<0.0007
Type of Alcohol	10.2	34.1	55.8	32.1	50	17.9	63.18	<0.0001
Weekly Alcohol (40%) Intake, 1cl=3,16g	6.2	24.3	69.3	40.7	30.9	28.4	86.53	<0.0001
Extra Salt	27.9	0	72.1	41.4	0	58.7	7.68	<0.0055
Daily Salt Intake (g)	12.8	51.8	35.4	13.6	44.4	42	2.15	>0.3413
Body Mass Index (kg/m^2)	65.5	29.2	5.3	44.4	51.2	4.3	19.48	<0.0050
Smoking (Number of Cigarettes Per Day)	60	33.2	6.8	47.5	48.1	4.3	9.00	<0.0111

Table 5. Risk points distribution (%) in regard to marital status and statistical analysis

Risk Factors	**Married n=269**			**Singles n=119**			**Statistical Comparison**	
	Risk Points (%)			**Risk Points**			χ^2	**p**
	1	**2**	**3-4**	**1**	**2**	**3-4**		
Daily Fruit Intake (Number of Servings Per Day)	26.8	49.8	23.4	26.1	50.4	23.4	0.02	> 0.988 0.988 0.9880*
Daily Vegetable Intake (Number of Servings Per Day)	72.5	24.2	3.3	66.4	27.7	5.9	2.14	>0.3430*
Daily Raw Cereal Intake (Number of Servings Per Day)	3.3	72.2	24.5	11.8	68.9	19.3	10.96	< 0.004
Daily Red Meat Intake (g)	5.6	15.2	79.2	7.6	18.6	73.9	1.35	> 0.508*
Type of Alcohol	21.2	39.8	39	13.1	42.9	42.0	1.95	> 0.378*
Weekly Alcohol Intake (cl, 40%) 1cl=3,16g	24.5	29	46.5	11.8	22.7	65.5	13.48	< 0.001
Extra Salt	36.4	0	63.6	26.9	0	73.1	3.36	> 0.660*
Daily Salt Intake (g)	16.8	53.5	19.7	5.1	37.8	57.1	29.1	< 0.001
Body Mass Index (kg/m^2)	50.2	43.1	6.7	73.1	26.1	0.8	19.66	< 0.001
Smoking (Number of Cigarettes Per Day)	53.2	73.7	46.7	58.8	10.1	31.1	0.41	> 0.009

* not statistically significant

Significant gender differences were observed for almost all diet risk factors (Table 4). Compared to men, women reported generally better eating habits to prevent cancer. No significant difference existed between men and women regarding the daily vegetable intake ($p>0.01$) and daily salt intake ($p>0.01$).

High-risk point's frequency among singles was found to be of less statistical significance comparing to married ones. Obesity was less likely to be cancer risk factor for singles comparing to married ones ($\chi^2= 19.66$, $p<0.01$). Statistically significant difference was also observed in daily raw cereal ($\chi^2= 10.96$, $p<0.01$), alcohol ($\chi^2= 13.48$, $p<0.01$) and salt intake ($\chi^2= 29.1$, $p<0.01$). This refers to married ones comparing to singles.

Since nutritional cancer development risk factors distribution was found to be different for men and women, singles and married ones, further studies should be focused on age differences and socioeconomic status. Defining distinct relation between eating habits and cancer risk is very complex, cancer affects different organs, there are many different kinds of food and nutritives, as well as many helping factors such as genetics, physical inactivity, stress (10-16).

Results of this study are an addition to the literature on dietary habits in our population connecting with cancer. Future research should focus on further development of tools for public health nutrition monitoring in this field.

CONCLUSION

1. These results can help to identify primary nutritional cancer development risk factors among citizens of Niš, as well as to define better prevention programs to be applied on endangered groups.
2. Citizens of Niš, aged 18 to 58 are at medium risk to develop cancer due to bad eating habits, smoking and alcohol intake. Cancer development is helped by stress, physical inactivity, genetics and other helping factors.
3. Women and singles, regarding cancer development risk, were found to have better nutritional profile than men did and married ones.
4. Cancer development prevention by improving citizens of Niš eating habits should be focused on cutting down on red meat and alcohol.

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