

The quality of the nutrition in smokers

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Abstract

OBJECTIVES: Approximately 30% of the adult Czech population smokes. Previous studies of smokers have documented diet sufficient in energy, but inadequate intake of dietary fibre, vitamins A, E, calcium and proteins.

DESIGN: Nutrition was assessed between the groups of the probands (over 18 years aged, 667 smokers, 1044 nonsmokers, 428 past smokers) from 1% random sample of the Czech population. All volunteers completed a one day dietary recall after instruction from a nutrition expert. The dietary recall calculated energy, proteins, fats, vitamins C and E, cholesterol, fibre, calcium and iron intake using the Nutridan programme.

RESULTS: Smokers had higher consumption of animal ($p=0.0034$), and total fat ($p=0.0315$), cholesterol ($p=0.005$), and lower intake of vitamin E ($p=0.004$) than nonsmokers. No other differences were found. The differences between past smokers and other groups were insignificant.

CONCLUSION: The smokers consumed more total and animal fat, cholesterol and less of vitamin E than nonsmokers.

INTRODUCTION

Approximately 30% of the adult Czech population smokes, which is similar, to other populations irrespective of gender (Králiková, 2012). The number of young smokers (aged 15–19 years 27% men and 24% women) in the Czech Republic is increasing despite repeated warnings about the harmful effects of the smoking.

Smoking is a primary risk factors, for the manifestation and progression of the several disease, including cardiovascular diseases and cancer (Worsley *et al.* 2012). Free radical-induced oxidative damage may play, regardless of the uncertain mechanism, important role in the pathogenesis of numerous smoking-related disorders. For example, adult smokers exhibit lower erythrocytes enzyme, activities and other pathological altera-

tions in blood elements than non-smokers (Kim *et al.* 2003).

The Czech Republic leads the world in number of deaths from colorectal cancer. Colorectal cancer is the second most common cancer in the both genders in Europe, and more than 400 000 cases of this cancer have been diagnosed in the past several years. Smokers and past smokers exhibit an increased risk of colorectal cancer, compared to nonsmokers (Axman *et al.* 2011, Leufkens *et al.* 2011).

Smokers also maintain poor long-term eating habits, including higher intake of alcohol and fast food products, which may negatively impact the development of hepatic and pancreatic diseases (Špičák *et al.* 2012).

Smoking is atherogenic via the promotion of abnormal lipid metabolism. Cigarette smoking is significantly associated with lower HDL

cholesterol and higher LDL cholesterol, predominantly in women, and a relationship between current heavy smoking (more than 20 pack-years) and dyslipidaemia has been published (Lee *et al.* 2011).

The consumption of food and other nutrients in pregnant women in relation to their smoking habits has been studied previously. Smokers exhibit a lower intake of vegetables, monounsaturated fatty acids, vitamin D, folates and calcium than nonsmoking subjects (Ortega *et al.* 1998).

A detailed analysis of the dietary habits of smokers, non-smokers and past smokers in the Czech Republic has not been performed.

MATERIAL AND METHODS

Volunteers were enrolled after signing an Informed consent and Patient information form as a part of the Czech post – MONICA study. Three groups were monitored: i) smokers (n=667; 383 males and 284 females), ii) nonsmokers (n=1044; 390 males and 654 females) and finally iii) past smokers (n=428; 273 males and 155 females). The basic descriptions are summarised in table 1. Smoker is every who smoke at least one cigarette per day, nonsmoker who never smoked and past smoker who does not smoke in the past year or more.

All volunteers completed a one day dietary recall after instruction from a nutrition expert. The dietary recall calculated energy, proteins, fats, vitamins C and E, cholesterol, fibre, calcium and iron intake using the Nutridan programme.

The data were analysed using a paired t-test, the two-sample t-test, ANOVA and multivariate linear

regression analysis. All data are expressed as the means \pm standard deviations. A *p*-value <0.05 was considered statistically significant.

All participants were Caucasians from the Central European Czech population. Written informed consent was obtained from all study participants, and the local ethics committee approved the design of the study according to the Helsinki Declaration (1975).

RESULTS

The consumption of animal fat ($p=0.0034$), total fat ($p=0.0315$) and cholesterol ($p=0.005$) was higher in smokers than nonsmokers, the intake of vitamin E was lower in smokers ($p=0.0004$). No significant changes in the other monitored variables were observed (Table 1). No significant differences in the investigated parameters were observed, when the groups were divided by gender or saccharide consumption. However smoking females (n=284) consumed 285.2 ± 94.7 g of saccharide per day, and nonsmoking females (n=654) consumed 307.7 ± 83.46 g/day ($p=0.046$).

DISCUSSION

Our study is the first analysis of the dietary habits of smokers, nonsmokers and past-smokers in the adult Czech population. We detected unfavourable dietary habits in smokers compared to nonsmokers. The higher intake of fat products in smokers was an adverse event because of the combination of these risk factors for cardiovascular diseases. We suggest reducing the consumption of saccharides and fats, due to the nega-

Tab. 1. The characteristics of the probands.

	Smokers (n=667)	Non smokers (n=1044)	Past smokers (n=428)	<i>p</i> -value
Age (years)	44.9 \pm 10.1	46.2 \pm 11.9	45.9 \pm 10.5	n.s.
Energy kJ	11241 \pm 4104	10874 \pm 3321	11005 \pm 3475	n.s.
Protein vegetable (g/d)	32.9 \pm 31.1	29.6 \pm 26.4	31.5 \pm 24.0	n.s.
Protein animal (g/d)	60.1 \pm 8.3	60.0 \pm 31.2	60.4 \pm 38.8	n.s.
Protein total (g/d)	91.3 \pm 41.9	91.5 \pm 177.2	91.9 \pm 59.1	n.s.
Fat vegetable (g/d)	21.5 \pm 18.4	22.2 \pm 17.0	22.6 \pm 18.0	n.s.
Fat animal (g/d)	70.9 \pm 38.8	64.8 \pm 35.8	66.5 \pm 34.5	0.0034
Fat total (g/d)	92.3 \pm 42.0	87.2 \pm 38.3	89.2 \pm 36.7	0.0315
Saccharides (g/d)	322.2 \pm 109.3	324.6 \pm 90.5	324.8 \pm 105.5	n.s.
Calcium (mg/d)	649.5 \pm 446.1	706.4 \pm 494.8	679.9 \pm 511.7	n.s.
Iron (mg/d)	18.0 \pm 23.6	17.7 \pm 15.0	18.3 \pm 17.8	n.s.
Fibre (g/d)	15.3 \pm 7.6	15.7 \pm 7.09	15.8 \pm 7.35	n.s.
Vitamin C (mg/d)	118.0 \pm 128.77	129.9 \pm 135.2	124.3 \pm 127.7	n.s.
Vitamin E (mg/d)	3.4 \pm 3.3	4.1 \pm 3.7	3.6 \pm 3.2	0.0004
Cholesterol (mg/d)	349.7 \pm 220.0	316.9 \pm 172.8	325.6 \pm 174.1	0.005

tive effects of smoking on saccharide metabolism. The dangers of smoking must be re-emphasised in type-1 and type-2 diabetes mellitus patients. type (Gerber *et al.* 2011). The percentage of diabetics in our groups was virtually identical to that of the Czech population as whole (i.e. 7.4% in both genders). A lower consumption of saccharides was observed in smoking females, perhaps as a compensation for smoking.

Smokers in our study ate a relatively energy-abundant diet. Long-term follow-up trials have demonstrated that the annual differences in weight gain between stable smokers and quitters is approximately 0.45 kg in both genders and quitters are two to three times more likely to become obese than current smokers (Travier *et al.* 2012).

However, the smokers in the present study consumed the greatest number of calories. Smoking is often associated with dining out (public-smoking is tolerated) eating fatty foods and insufficient physical activity in the Czech Republic.

The higher consumption of vitamin C in smokers has been published in adult Inuvialuit smokers (Rittmueller *et al.* 2012) but we did not to confirm these results. Rittmueller *et al.* observed lower dietary quality and more than 50% of the smokers in their study reported an inadequate intake of fibre and vitamin E.

The recommended daily dose of vitamin E is 10 mg, but this value was not achieved in any of the groups, in the present study. Cigarette smoking is a source of oxidative stress and it may alter vitamin E utilisation in humans (Bruno and Traber 2006).

The consumption of iron was approximately 18 mg in smokers. The recommended dose of iron is approximately 14 mg daily. Iron deficiency is a risk factor for diseases such as osteoporosis, renal tubular dysfunction, cardiovascular diseases, endometrial cancer and breast cancer (Gallagher *et al.* 2011). Smokers in our study consumed the average recommended dose of iron.

The recommended dose of fibre is approximately 30 g daily. Neither smokers nor non-smokers in the Czech population consume the average recommended amount of fibre. A low fibre intake (i.e. roughly half of the recommended daily dose), negatively impacts health, and it may contribute to the high prevalence and mortality of colorectal cancer in the Czech Republic.

Several studies have analyzed smoking in young people (Kim *et al.* 2003), smoking in women (Gallagher *et al.* 2011), and the association of smoking with social issues (Yen *et al.* 2010), but only one of the study could be compared with our group.

A comparison our smokers to smokers in the Canadian Aboriginal population demonstrated that our smokers consumed less calcium (650×1433 mg), iron (18×27 mg), proteins (92×150 mg), vitamin C (118×206 mg), vitamin E (3.4×5.7 mg), cholesterol (349.7×513 mg) and also fat (92×122 g). The intake of fibre (15.3×18 g) and carbohydrates (322×397 g) was comparable to that in our study (Rittmueller *et al.* 2012).

The consumption of calcium, fibre and vitamin C has increased in the Czech Republic over the last several years, regardless of smoking and gender (Dostalova *et al.* 2009). Nutrition in Czech smokers should be significantly improved to reduce energy intake and increased the intake of fibre, low-dietary products, fruits and vegetables.

Smoking is as a major preventable risk factor for serious diseases. However, smoking levels have not decreased, despite the risk for the development of other diseases and repeated public education on nutrition by professionals (e.g. general practitioners, specialists, nutritional experts).

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