Smoking and the Risk of Colorectal Cancer and Colorectal Polyps

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Purpose: Tobacco is one of the risk factors in colon cancer and colon polyps. We have studied the connection between smoking and the risk of developing the colorectal cancer and colorectal polyps.

Materials and methods: Our study refers to patients with mucosal modifications at the colon level, hospitalized and colonoscopy investigated in the 1st Clinic of Gastroenterology, Tg Mures between 2008–2010.

Results: There were 193 patients with colorectal cancer and colorectal polyps compared with 206 control patients investigated in the same hospital. From the study group, 53 patients (27.46%) were 'current smokers' compared with 'control patients' 27 patients (13.10%). As a result of this comparison there was a significant association with an increased risk for colorectal cancer and colorectal polyps (OR = 2.77, CI: 1.64–4.67). It was also observed a significant increased tendency of the risk for the colorectal polyps and colorectal cancer in parallel with the increase of the number of smoked cigarettes per day and years of cigarette smoking (< 10 cigarettes/day – OR = 1.03, CI: 0.45–2.33; 10-20 cigarettes/day – OR = 4.47, CI: 1.73–10.55; > 20 cigarettes/day – OR = 5.41, CI: 2.13–13.72 and < 10 years of cigarette smoking OR = 1.41, CI: 0.63–3.16; 10–20 years of cigarette smoking OR = 3.63, CI: 1.46-8.98; > 20 years of cigarette smoking OR = 4.43, CI: 1.83–10.74).

Conclusions: A high exposure to cigarette smoking is strongly associated with an increased risk of colorectal cancer and colorectal polyps.

Keywords: colorectal cancer, colorectal polyps, smoking, colonoscopy

Introduction

Tobacco is estimated to cause approximately 170 000 cancer deaths in 2008 in the United States. It has been established an association between the tobacco use and the development of premalignant colorectal adenomas [1].

Colorectal cancer is one of the most common cancers in the world, and is the second leading cause of cancer-related deaths in the USA. The incidence of colorectal neoplasm in Asia has increased over recent decades. Colorectal adenomatous polyps are considered precursors of invasive colorectal adenocarcinoma [2].

Tobacco smoke contains various types of carcinogens such as polycyclic aromatic hydrocarbons, heterocyclic amines, aromatic amines and N-nitrosamines which require metabolic activation and detoxification by different enzymatic pathways [3].

The Carcinogens from cigarette smoke cause irreversible genetic damage in the normal colorectal mucosa [4], via the circulation after the bronchioles-alveolar tract absorption into the bloodstream or by direct contact after ingestion with saliva. Cigarette smoking has been consistently associated with small and large colorectal adenomas, which are generally accepted as being precursor lesions for colorectal cancer, exposure to tobacco constituents may be considered a trigger factor for colorectal carcinogenesis [5].

We studied the association between cigarette smoking and the risk to develop the colorectal cancer and colorectal polyps.

Materials and methods

We have performed a retrospective study reviewing the medical records of all consecutive patients hospitalized with mucosal modifications at the colon level, investigated by colonoscopy in the 1st Clinic of Gastroenterology Targu Mures between 2008 and 2010. We have included the newly diagnosed patients between the age of 18 and 90 years with colorectal cancer and colon polyps, having a confirmed pathological diagnosis. Patients with previously colon cancer surgery, patients with uncertain pathological diagnosis were excluded.

We have recorded demographic data, clinical aspects, history of drug intake, colonoscopy findings, cigarette smoking and alcohol habits. The smokers were divided into 3 groups: 'never smokers', 'former smokers' and 'current smokers'. The 'current smokers' group' was divided according to the number of the smoked cigarettes per day and the years of cigarette smoking. The clinical results of the study group were compared with the 'control group'.

Controls were randomly selected from the study area, respecting the same criteria as it was described for the study group, except that they had not been diagnosed with colorectal cancer or colon polyps by colonoscopy examination.

The data were collected with 'Microsoft Excel' program and analyzed with Graph Pad Instant Program. We analyzed the association between cigarette smoking and colorectal cancer and colon polyps risk, calculating 'odds ratio' (OR) and 'confidence interval' (95%) with 'Chi square test'. The 'statistical significance' was defined as $p < 0.05$.

Table I. Clinical and demographical data

	Study group		Control group		p value
	N=193	%	N=206	%	
Male	130	67.35	105	50.97	
Age	64.34		61.17		
Alcohol intake > 100 ml/ week	57	29.53	36	17.47	0.0044
Cigarette smoking					
Never smoked	114	59.06	161	78.15	
Current smokers	53	27.46	27	13.10	0.0001
Chronic disease					
Arterial hypertension	57	29.53	63	30.58	NS
Ischemic heart disease	55	28.49	56	27.18	NS
Respiratory disease	6	3.10	9	4.36	NS
Renal disease	9	4.66	3	1.45	NS
Rheumatoid disease	5	2.59	13	6.31	NS
Chronic gastritis	35	18.13	46	22.33	NS
Inflammatory bowel disease	15	7.77	23	11.16	NS
Hemorrhoids	17	8.80	31	15.04	NS
Body mass index >30	53	27.46	34	16.50	0.0081
Aspirin usage (75–250 mg/day)	15	7.77	24	11.65	NS
Hypercholesterolemia	40	20.72	32	15.53	NS
Diabetes mellitus	10	5.18	12	5.82	NS
Family history					
Colorectal polyps	9	4.66	3	1.45	NS

Table II. The risk of colorectal cancer and colorectal polyps according to cigarette smoking

	Study group		Control		OR (95% CI)	p
	No.	%	No.	%		
Both sexes						
Never smoked	114	59.06	161	78.15	1.00 (referent)	
Former smoker	26	13.47	18	8.73	2.04 (1.06–3.89)	0.0286
Current smoker	53	27.46	27	13.10	2.77 (1.64–4.67)	0.0001
No. of cigarettes/day						
< 10	11	5.69	15	7.28	1.03 (0.45–2.33)	NS
10–20	19	9.84	6	2.91	4.47 (1.73–11.55)	0.0018
> 20	23	11.91	6	2.91	5.41 (2.13–13.72)	0.0002
Years of cigarette smoking						
< 10	13	6.73	13	6.31	1.41 (0.63–3.16)	NS
10–20	18	9.32	7	3.39	3.63 (1.46–8.98)	0.0062
> 20	22	11.39	7	3.39	4.43 (1.83–10.74)	0.0008
Men						
Never smoked	65	50.00	69	65.71	1.00 (referent)	
Former smoker	22	16.92	17	16.19	1.37 (0.67–2.81)	NS
No. of cigarettes/day						
< 10	8	6.15	11	10.47	0.77 (0.29–2.04)	NS
10–20	15	11.53	4	3.80	3.98 (1.25–12.62)	0.0145
> 20	20	15.38	4	3.80	5.30 (1.72–16.36)	0.0016

Results

In the study there have been included 193 patients from which 43 (22.27%) were diagnosed with colorectal cancer and 150 (77.72%) with colon polyps. The mean age was 64.34 years in the study group and 61.17 years in the control group. Clinical and demographical data are shown in Table I.

In the study group 57 patients (29.53%) with alcohol intake habits were of a statistical significance (OR = 1.97, CI: 1.23–3.18, p = 0.0044) in comparison to 'control group' 36 patients (17.47%). There were no differences in age, sex, chronic diseases and aspirin users between the two groups.

Obesity was more frequent in the group of the diagnosed patients with colorectal cancer and colorectal polyps (53 patients, 27.46%; OR = 1.91, CI: 1.17–3.11, p = 0.0081), in comparison to 'control group' (34 patients, 16.50%).

The risk of colorectal cancer and colorectal polyps according to cigarette smoking are shown in Table II. From a total of 193 patients with colorectal polyps and colorectal cancer, 53 patients (27.46%) were 'current smokers', compared to 'control patients' (27 patients, 13.10%). According to study there was a significant association with an increased risk for colorectal cancer and colorectal polyps (OR = 2.77, CI: 1.64–4.67).

It has been observed a significant increase tendency of the risk of colorectal polyps and colorectal cancer in parallel with the increase of the number of the smoked cigarettes per day and the years of cigarette smoking (< 10 cigarettes/day OR: 1.03, CI: 0.45–2.33; 10–20 cigarettes/day OR: 4.47, CI: 1.73–10.55; > 20 cigarettes/day OR: 5.41, CI: 2.13–13.72; and < 10 years of cigarettes smo-king OR = 1.41, CI: 0.63–3.16; 10–20 years of cigarette smoking OR = 3.63, CI: 1.46–8.98; > 20 years of cigarette smoking OR = 4.43, CI: 1.83–10.74).

In the study group, 26 patients (13.47%) were 'former smokers' compared with 'control patients' (18 patients, 8.73%). They had a moderate risk to develop colorectal polyps and colorectal cancer (OR= 2.04, CI: 1.06–3.89) The women smokers were less than men smokers (14 women smokers versus 65 men smokers).

Discussions

In our study we have found that smoking was associated with an increased risk of developing the colorectal polyps and colorectal cancer.

In our study the 'former smokers' had a moderate risk (OR = 2.04, CI: 1.06–3.89) for colorectal polyps and colorectal cancer, in comparison to other studies in which the smoking cessation was associated with a significant decrease of the risk [6].

A long period of smoking induction (smoking for more than 20 years) was associated with an increased risk of colorectal polyps and colorectal cancer (> 20 years of cigarette smoking OR = 4.43, CI: 1.83–10.74), like in other studies. Smoking status and intensity are shown to be associated with an increase of genetic alterations in adenomas and sporadic colon cancers and it was also noted an increase in p53 overexpression and the presence of transversion mutations in APC, K-ras and p53 for ever smokers compared to never smokers [1].

As in other studies [7] the risk to develop colorectal polyps and colorectal cancer has significantly and consequently increased in parallel with the increase of the number of cigarette smoking per day. In this way the strongest association was confirmed to the patients who have

smoked more than 20 cigarettes per day (OR = 5.41, CI: 2.13–13.72), in comparison to the patients who smoked less cigarettes per day. (10–20 cigarettes/day OR = 4.47, CI: 1.73–10.55; less than 10 cigarettes/day OR = 1.03, CI: 0.45–2.33)

Conclusions

The results in our study have showed that smoking was associated with an increased risk for the development of colorectal polyps and colorectal cancer.

A high exposure to cigarette smoking was strongly associated with an increased risk of colorectal cancer and colorectal polyps.

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