First Six Years of Implementing Colorectal Cancer Screening in the Osijek-Baranja County, Croatia – Can We Do Better?

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ABSTRACT

The primary goal of this paper is to evaluate the efficiency of the Colorectal Cancer Screening Program in the Osijek-Baranja County. The screening method for early detection of colorectal cancer was the guaiac Faecal Occult Blood Test (gFOBT) and colonoscopy for gFOBT positive finding. The target population were asymptomatic subjects at average risk, aged 50–74. The responding rate was 20.3% (14.9% of men and 19.3% of women). The percentage of gFOBT positive tests was 8.5% (11.2% of men and 6.6% of women). From the 1,657 individuals who were invited to further assessment (884 men and 773 women), 1,157 underwent a colonoscopy exam (649 men and 508 women). We can conclude that the response to FOBT in our county was extremely poor. 83 carcinomas were found, with almost double findings among men than among women. Our population has a significantly higher number of men with malignant and premalignant changes when compared with women. Considering the higher incidence among men, as well as an increase in incidence in the entire population, we have to take care that our public health programmes are being created with this taken into account, as to increase the response rate, especially among those with a higher risk of developing a disease.

Key words: colorectal cancer, screening program, Osijek-Baranja County

Introduction

Colorectal cancer (CRC) is the third most prevalent human cancer worldwide, with 1 million estimated new cases annually¹. Low socioeconomic status (SES) is associated with an increased risk for the development of colorectal cancer; one study estimated the CRC risk to be about 30 percent increased in the lowest as compared to the highest SES quintile¹. Unhealthy behaviour such as physical inactivity, unhealthy diet, smoking, and obesity are thought to account for a substantial proportion (estimates of one-third to one-half) of the socioeconomic disparity in risk of new onset colorectal cancer^{2–5}. CRC incidence and mortality rates vary markedly around the world. Globally, CRC is the third most commonly diagnosed cancer in males and the second in females, with over 1.2 million new cases and 608,700 deaths estimated to have occurred in 2008⁶. The highest incidence rates are in Australia and New Zealand, Europe and North America, and the lowest rates are found in Africa and South-Central Asia¹. These geographic differences appear to be attributable to differences in dietary and environmental exposures that are imposed upon a background of genetically determined susceptibility. The incidence of CRC is higher for men, and the risk of the disease increases with age, as the majority of cases are diagnosed in patients more than 50 years of age⁷. From 2005–2009, the median age at diagnosis for cancer of the colon and rectum was 69 years of age⁸.

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TABLE 1							
INCIDENCE OF CRC IN OSIJEK-BARANJA COUNTY PER							
GENDER FROM 1991 UNTIL 2009							

Year	Male		Fei	nale	All		
	Ν	Rate	Ν	Rate	Ν	Rate	
1991	52	29.3	64	33.7	116	31.6	
1992	46	25.9	43	22.7	89	24.2	
1993	55	31.0	51	26.9	106	28.9	
1994	71	40.0	38	20.0	109	29.7	
1995	60	33.8	40	21.1	100	27.2	
1996	60	33.8	60	31.6	120	32.7	
1997	66	37.2	82	43.2	148	40.3	
1998	85	47.9	67	35.3	152	41.4	
1999	90	50.7	80	42.1	170	46.3	
2000	89	50.2	93	49.0	182	49.6	
2001	85	53.6	96	55.9	181	54.8	
2002	105	66.2	86	50.0	191	57.8	
2003	115	72.5	91	53.0	206	62.3	
2004	94	59.2	88	51.2	182	55.1	
2005	101	63.7	76	44.2	177	53.6	
2006	106	66.8	88	51.2	194	58.7	
2007	119	75.0	89	51.8	208	62.9	
2008	119	75.0	83	48.3	202	61.1	
2009	117	73.7	81	47.1	198	59.9	
All	1225		1018		2243		

 \ast – Source: Institute of Public Health Osijek-Baranja County, N
 – number, Rate – rate/100,000

In Croatia there has been an increase in CRC incidence from 34.5/100,000 (1990) to 64/100,000 (2005), as well as an increase in mortality from 21.9/100,000 (1990) to 40.6/100,000 (2006)^{9–25}. An increase in incidence can also be seen in the Osijek-Baranja County (OBC) (Table 1).

Considering our county is in a depopulation phase, and that the age structure is continuing to lean toward older generations, a further increase in incidence of colorectal carcinoma, as well as the ensuing burdening of the health sector, can be expected.

In 2003, recommendations for screening programs were issued by the Council of the European Union (EU). A screening program of one sort or another has been implemented in 19 of 27 EU countries. Response to the screening is as follows: 52% in the United Kingdom²⁶, 42% in France (2.7% positive)²⁷, 48.0% in Italy (5.5% positive)²⁸, 70.8% in Finland (women)²⁹, 20% in the Czech Republic³⁰. In Croatia, The National Program of Prevention and Early Detection of Colorectal Cancer started on November 2007.

Material and Methods

The screening method for early detection of colorectal cancer was the guaiac Faecal Occult Blood Test (gFOBT).

The target population ware asymptomatic population at average risk, aged 50-74. The target population was 105,075 people, compromising 31.2% of the county's population. The expected time of one screening cycle was 2 years. Invitation letters have been sent by mail. In an envelope, there are three gFOBT with instructions for their use (because adenomatous polyps and cancers are thought to bleed intermittently, gFOBT require four samples from three different feces), a questionnaire about risk factors and an educational brochure. The respondents were given detailed instructions on how to diet before sampling. The tests were processed without rehydration. The analysis of data from the questionnaires will assess the prevalence of risk factors in the population. Invited people have been asked to mail applied testing-cards back together with a filled out questionnaire. People testing positive are invited for colonoscopy in the Clinical Hospital Centre Osijek by mail.

The individuals who tested positive for gFOBT were invited to undergo a colonoscopy examination. During colonoscopy examination the premalignant lesions are removed and the samples are sent for histopathological analysis. The patients were referred to colonoscopy surveillance if appropriate, depending on the results of the analysis. The colonoscopy results were collected and analysed in the Institute of Public Health. In first year of program implementation the central database for online data input was established. The results of testing, colonoscopy and Question form collecting and input in the County Institute of Public Health.

The histologic classification of polyps and cancers was based on World Health Organization criteria³¹. Advanced adenoma was defined as an adenoma with any of the following features: adenomas larger than 9 mm or with villous component >20% or with high dysplasia ^{32,33}. The risk of malignancy within an adenomatous polyp correlates with size, histologic type, and degree of dysplasia³⁴. Cancer was defined as the invasion of malignant cells beyond the muscularis mucosae. Patients with intramucosal carcinoma or carcinoma in situ were classified as having high-grade dysplasia.

Statistical analysis

Contingency tables were used in the analysis. The software SAS for Windows (version 8.2, SAS Institute Inc, Cary, NC) was used for the analysis³⁵.

Results

Until February 2013 we sent FOBT to 105,075 individuals (100.0% of target population); 48,678 men and 56,397 women. 8,609 (4.635 men and 3.974 women) had an incorrect address, performed a colonoscopy or FOBT in the year before the Program started, died or have declared themselves unwilling to undergo testing (Table 2).

The responding rate (of those who received the invitation) was 20.3% (14.9% of men and 19.3% of women). The percentage of FOBT positive tests was 8.5% (11.2%

TABLE 2

No OF INVITED PERSONS, PERSONS WITH INCORRECT ADDRESSE, DIED, WHO PERFORMED A COLONOSKOPY OR FOBT IN THE
PAST YEAR, OR DO NOT WANT IN NACIONAL PROGRAM OF EARLY DETECTION OF CRC IN OSIJEK-BARANJA COUNTY UNTIL
FEBRUARY 2013

Age group	A. Invited B. Incorrect addresses+died+who per- formed a colonoscopy or FOBT done in the past year+do not want						A – B	A – B	
	Male	Female	All subjects	Male	Female	All subjects	Male	Female	All subjects
55–59	11,121	11,212	22,333	792	721	1,513	11,913	11,933	20,820
55–59	11,121	11,212	22,333	792	721	1,513	11,913	11,933	20,820
60–64	14,492	15,683	30,175	1,563	1,180	2,743	16,055	16,863	27,432
65–69	6,383	7,821	14,204	757	634	1,391	7,140	8,455	12,813
70-74	11,163	16,056	27,219	1,229	1,165	2,394	12,392	17,221	24,825
70-74	11,163	16,056	27,219	1,229	1,165	2,394	12,392	17,221	24,825
All	48,678	56,397	105,075	4,635	3,974	8,609	53,313	60,371	96,466

TABLE 3

RESULTS OF NACIONAL PROGRAM OF EARLY DETECTION OF CRC IN OSIJEK-BARANJA COUNTY UNTIL FEBRUARY 2013 - ALL

Results	Males	Females	All subjects
Invited subjects	53,313	60,371	96,466
Responders	7,955	11,645	19,600
Parattendance rate	14.9%	19.3%	20.3%
Faulty	60	152	212
FOBT positive	887	770	1,657
Positivity rate	11.2%	6.6%	8.5%
Patients invited to colonoscopy	884	773	1,657
Compliers to colonoscopy	649	508	1,157
Compliance %	73.4%	65.7%	69.8%
Number of cancers	61	22	83
Numbers of Advanced Adenomas	206	100	306
Positive predictive value (PPV) for cancer	9.4%	4.3%	7.2%
Positive predictive value (PPV) for advanced adenomas	31.7%	19.7%	26.4%
Detection rate (DR) for cancer	7.7%	1.9‰	4.3%
Detection rate (DR) for advanced adenomas	25.9%	8.6%	15.6%
Detection rate (DR) for cancer and advanced adenomas	33.6%	10.5%	19.8%

of men and 6.6% of women). From the 1,657 individuals who were invited (884 men and 773 women) 1,157 underwent a colonoscopy exam (649 men and 508 women).

87.6% had a pathological finding, 92.0% in men and 82.1% in women. There were 83 newly discovered carcinomas (7.2% of those who underwent colonoscopy), 599 polyps (51.8%), 196 haemorrhoids (16.9%), 87 diverticula (7.5%) and 49 other diagnoses (4.2%). 306 polyps was advanced adenomas (26.4%). In 143 individuals the findings were without pathological findings (12.4%).

Discussion

CRC is the second most frequent malignant disease in developed countries³⁶. It has been estimated that in

2006, 412,000 people were diagnosed with CRC in Europe, and 207,400 of them died of the disease³⁷. In the Osijek-Baranja County the National programme started in 2007.

gFOBT and optical colonoscopy (OC) are currently recommended for population-based screening programs in Croatia³⁸. Moreover, the European Guidelines on quality assurance for CRC screening has recently recommended fecal immunochemical test (FIT) as the first choice test in place of the guaiac test³⁹. The reason for choosing gFOBT was a big difference in price, as well as the geographic characteristics of the country that prevented transportation of FIT to the lab during the scheduled period (up to 12 hours since the sample collection). Although the Programme stated an invitation cycle of two years³⁸, we are only concluding the first screening

 TABLE 4

 RESULTS OF COLONOSCOPY IN NACIONAL PROGRAM OF EARLY DETECTION OF CRC IN OSIJEK-BARANJA COUNTY UNTIL FEBRUARY 2013

	Males		Females		All subjects	
-	Ν	%	Ν	%	Ν	%
Received a call for colonoscopy	884	53.3	773	46.7	1657	100.0
Insufficient preparation, died or give up	235	26.6	265	34.3	500	30.2
Performed the colonoscopy	649	73.4	508	65.7	1157	69.8
All subjects	884	100.0	773	100.0	1657	100.0
Normal findings	52	8.0	91	17.9	143	12.4
Carcinomas	61	9.4	22	4.3	83	7.2
Polip	379	58.4	220	43.3	599	51.8
Hemorrhoids	105	16.2	91	17.9	196	16.9
Diverticulosis	37	5.7	50	9.8	87	7.5
Other	15	2.3	34	6.7	49	4.2
All findings	649	100.0	508	100.0	1157	100.0

cycle. The reasons for this prolongation were problems in implementation⁴⁰, as well as an inadequate estimation of health sector funds; for instance, an inadequate number of colonoscopies and personnel in colonoscopy units. Up until February 2013 response rate on gFOBT was 22.2% (20.1% of men and 23.9% of women). If we compare the response rate to that of other European countries (GB $52\%^{26}$, France $42\%^{27}$, Italy $48.0\%^{28}$, Finland $70.8\%^{29}$), we can conclude that the response to FOBT in our county is extremely poor, far poorer than expected, but still in line with the rest of Croatia⁴¹.

The percent of gFOBT positive tests was 8.5%; 11.2% of men and 6.6% of women. Up until now 1,157 colonoscopy exams were conducted in the screening programme.

The average response rate to OC was 69.8% which is far lower than in similar Programs in Europe²⁸. Perhaps the reason for a low response rate to OC was an invitation via mail and the insufficient education of the population. Simultaneously with sending invitations to OC to the respondent, a message to the GP about the invitation was sent. Thus the GP had the ability to check the reason for not responding to the invitation. The impact on the response to OC was affected by poor preparation for the examination. These subjects are then re-scheduled. One part of the re-scheduled subjects was lost from the records because they came to OC with a GP referral.

Men had as high as 92.0% of pathological findings, while women had 82.1%. 83 (7.2%) carcinoma were found, with almost double findings among men (9.4%) than among women (4.3%). Detection rate (DR) per 1,000 screened subjects for cancer was 4.3% (7.7% in men and 1.9% in women) and for advanced adenomas (AA) was 15.6% (25.9% in men and 8.6% in women) which is much moor than e.g. in Italy²⁸, USA⁴². DR for cancer and advanced adenomas was 20.0% (33.7% in men and 10.5% in women).

These results are slightly higher than those of similar programmes in the Czech Republic¹⁰, while, for instance, France had a higher percentage of cases with carcinoma (10.6%), but a lower percentage when combined with polyps $(33.1\%)^{43}$ than in our population. We can conclude that our population has a significantly higher number of men with malignant and premalignant changes when compared with women. Considering only one fifth of the population responded to the invite, a rough estimate is that there is a five time larger number of people with malignant and premalignant lesions in the entire population. Early detection means successful treatment and a better quality of life^{44,45}.

The implementation of similar programmes in the world has shown a greater response rate among women and higher socioeconomic classes^{46,47}, as well as the influence of the chosen general practitioner $(GP)^{48,49}$. Considering the higher incidence among men, as well as an increase in incidence in the entire population, we have to take care that our public health programmes are being created with this taken into account, as to increase the response rate, especially among those with a higher risk of developing a disease.

Conclusions

We can conclude that the response to gFOBT in our county is extremely poor, far poorer than expected, but still in line with the rest of Croatia. 83 carcinomas were found, with almost thrice findings among men than among women. Our population has a significantly higher number of men with malignant and premalignant changes when compared with women. Considering only one fifth of the population responded to the invite, a rough estimate is that there is a five time larger number of people with malignant and premalignant lesions in the entire population. Considering the higher incidence among men, as well as an increase in incidence in the entire population, we have to take care that our public health programmes are being created with this taken into account, as to increase the response rate, especially among those with a higher risk of developing a disease.

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PRVIH ŠEST GODINA IMPLEMENTACIJE PROGRAMA RANOG OTKRIVANJA RAKA DEBELOG CRIJEVA U OSJEČKO-BARANJSKOJ ŽUPANIJI – MOŽEMO LI BOLJE?

SAŽETAK

Cilj ovog rada je prikazati rezultate Nacionalnog programa ranog otkrivanja raka debelog crijeva u Osječko-baranjskoj županiji koji je započeo 2007. godine. Iako je bio predviđen interval probira od dvije godine, prvi ciklus je završen nakon šest godina. Razlog ovog vremenskog kašnjenja su tehničke poteškoće u provedbi i neadekvatno procjenjeni resursi prije početka Programa. Metoda skrininga je test na nevidljivo krvarenje u stolici, te kolonoskopija za osobe s pozitivnim nalazom ovog testa. Do veljače 2013. godine pozvano je 105 075 osoba u dobi 50 do 74 godina. Na kraju prvog ciklusa odaziv je 20,3% (14.9% muškaraca i 19,3% žena). 8,5% osoba je bilo pozitivno na nevidljivo krvarenje (11,2% muškaraca i 6,6% žena). Rezultati odaziva su značajno manji od planiranih 60%. Na kolonoskopiju je pozvano 1657 osoba (884 muškaraca i 773 žena) a odazvalo se 1157 osoba (649 muškaraca i 508 žena). U populaciji muškaraca je značajno veći udio malignih i premalignih promjena. Obzirom da se na rano otkrivanje odazvala petina populacije, gruba je procjena da je u populaciji pet puta više osoba s malignim i premalignim lezijama. Iskustva u provođenju Nacionalnog programa potrebno je implementirati u slijedeće cikluse kako bi povećali odaziv, a time otkrili premaligne promjene na vrijeme i povećali preživljavanje oboljelih od kolorektalnog karcinoma, te povećali kvalitetu života oboljelih.