Incidence and Prevalence of Inflammatory Bowel Disease in Vukovarsko-Srijemska County, Croatia, 1991–2000 and 2001–2010: A Population-Based Study

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A B S T R A C T

Inflammatory bowel diseases (IBD), Crohn's disease (CD) and ulcerative colitis (UC), were retrospectively assessed on the incidence and prevalence in Vukovarsko-Srijemska County, continental Croatia. There were a total number of 150 patients, 119 with UC and 31 with CD. Of them, 79.3% were patients with UC, indicating a predominant participation of UC in the sample. Comparisons between the period of surveillance, 2001-2010, and the decade before, 1991-2000, showed a significant increase in the incidence rates of both, UC and CD (UC 3.5, CD 0.95, 2001-2010, and UC 1.0, CD 0.45, 1991-2000). Comparison of this study with that performed in Primorsko-goranska County, coastal Croatia, revealed different distribution patterns of IBD. In Primorsko-goranska County, significantly higher incidence and prevalence rates of UC and CD and rather equal ratios between two diseases, were observed. The results are indicative of the differences between more developed Western and less developed Eastern parts of Croatia.

Key words: inflammatory bowel diseases, Crohn's disease, ulcerative colitis, a cross-sectional cohort study, the incidence, prevalence, North-Eastern Croatia

Introduction

Inflammatory bowel disease (IBD) is the common term for two closely related chronic intestinal disorders, Crohn's disease (CD) and ulcerative colitis (UC). Both types of disorders typically begin in young adulthood and sustain in a chronic way, along a variable course of inflammation exacerbations and development of complications, which leads to a substantial reduction of a quality of life and high health care costs. These disorders cannot be strictly distinguished either pathologically, although otherwise differ from each other sufficiently to meet the criteria as independent entities[1].

During the course of CD, the inflammatory process can involve any part of the digestive tract, from the mouth to the anus, but most commonly affects the distal ileum and the colon. Chronic inflammation, followed by superficial and deep ulcers, precedes the development of strictures and penetrating complications. Intestinal surgery may be required to as many as 80% of cases. UC involves the rectum and may spread up to the colon. In contrast to CD, inflammation process remains localised in the mucosa. This may be the reason why UC is less prone to the development of complications, compared to CD. Moreover, in a majority of patients with UC, the clinical course maintains rather mild[2].

A number of candidate etiologic factors for IBD have been postulated so far, including genetic, inherited, environmental and behavioural influences[3,4]. In the past, epidemiological observations were the only source of infor-

mation on potential causes of these diseases[2]. Even nowadays, when advanced techniques, involving transgenic mice and genomewide association studies, enable municious data on patophysiology of IBD – epidemiologic and population-based studies remain the milestone methods to assess the spread and changes in occurrence of these diseases, which in a great part depends on changes in their causes[2,4].

The highest incidence and prevalence of UC and CD have been reported in the populations of developed areas of Northern Europe and North America[2,5]. In general, observations performed in the mid of the past century indicated that there was a gradient in prevalence of IBD, from North to South (the preliminary explanation included differences in climate and the number of sunny days per year) and, to a lesser degree, from West to East (an explanation is provided by the Hygiene hypothesis which indicates that a high level of sanitation, frequent use of antibiotics and mandatory vaccination, in developed countries, lead to poor immunization of children to some antigens and the breakdown of tolerance to these antigens later in the life)[5,6].

The epidemiologic landscape has been changing in the last two decades. IBD has emerged in regions in which it has rarely been, or has not been at all registered before, including countries of Eastern Europe, continental and South-East Asia and North Africa, while it has been slowing down in developed countries[2,7,8]. When IBD is identified in a new population, UC precedes CD, having a higher incidence. In developed countries, there is now the reverse, by turning the domination of UC towards the higher incidence of CD[8]. These recent epidemiologic features are thought to correspond with the westernised lifestyles, including smoking, diets high in fat and sugar, use of medication and psycho-social stress[9]. In terms of that, IBD is likely to emerge as a global disease.

All these speculations about causes of IBD must however be taken with caution, as an introduction of immunosuppressant therapy, and more recently, biologic treatment, by modifying the natural history, could also affect the epidemiologic features of IBD[10]. In addition, there could be an insufficient reporting on the presence of IBD, in the morbidity and mortality data, in lower developed countries[2]. Racial and ethnic relations, found important in some populations, and the results of the immigration studies, have also added some new insights into the causes of IBD[11,12].

Aims

The first relevant epidemiologic study on the incidence and prevalence of IBD, in Croatia, was performed in Primorsko-goranska (P-g) County, 2000–2004 [13]. The incidence and prevalence rates (per 100,000) for UC counted 5.97 and 53.9 respectively and for CD 5.58 and 46.40 respectively, the results being in the intermediate between those obtained for developed and developing countries[5,9].

The aim of this study was to estimate the incidence and prevalence of UC and CD in Vukovarsko-Srijemska (V-s) County, located in the North-Eastern continental part of Croatia, and to compare these results with those found in Primorsko-goranska County, a representative of the coastal part of Croatia, in order to assess the hypothesis on the existence of a North to South gradient. This study can be classified as a retrospective and cross-sectional population-based study.

Another aim was to compare the two 10-year periods, 1991–2000 and 2001–2010, that is, prior/during and after the War in Croatia, in order to prove the hypothesis that the incidence and prevalence of IBD in the post-war period has been increasing. In relation to this, the region of Eastern Slavonia was directly striken by the War in Croatia (1991–1997) and experienced deep demographic changes during the war and long post-war period. The population, especially displaced persons, refugees and immigrants, were affected by war traumas, which could influence their health status, operating via bad emotions, psycho-social stress and bad eating and life-style habits[14].

Subjects and Methods

Subjects

The research population included adult (=18) insured persons of the Regional Office of the Croatian Institute for Health Insurance of Vukovarsko-Srijemska County. This population was based on the total number of 204 768 citizens living in the area of 2454 km^2 of that County, as according to the last census, 2001.

The examined sample comprised patients diagnosed with IBD (UC, or CD), 150 of them in a total. There were 119 patients diagnosed with UC and 31 patients with CD. They were identified according to the hospital's patient records. Documentation of the General Hospitals Vukovar and Vinkovci, the residential ones, was used for this purpose. Institutions in the near surroundings, Clinical Hospital Centre Osijek and General Hospital »Dr Josip Bencevic« Slavonski Brod, were also contacted, as some patients were directly referred to these institutions by their primary physicians, without being priory registered in the resident hospitals.

Methods

All identified patients were contacted personally, or by phone, and interviewed. Data were obtained from each patient according to two types of protocols standardized for case ascertainment. The first one was adapted to data collecting on the incidence of IBD and the second one – on prevalence of IBD. All data forms were completed by the gastroenterologist. The introductory parts, including general data, were identical for both types of protocols. The protocol addressing incidence data contained several specific compartments, to gain answers on: demographic features (an immigrant, or born in the resident County), education, employment status, family history of IBD (including data on parents, brothers/sisters and children) and risk factors. The part

of the questionnaire was devoted specifically to a disease, including data such as the type and the time of the diagnosis, symptoms and their duration prior the first medical check up, body weight at the time of the first physical examination, weight loss in the last three months, performed diagnostic procedures and the extent of a disease.

The protocol designed for prevalence data was extended for the part where answers were required on the questions on the natural history of a disease, the presence/absence of the intestinal and extraintestinal complications, the number and types of surgical interventions and the results of patohistological examinations. These collected data were used to determine phenotypes of either UC or CD, as according to the Montreal classification 2005[15].

Statistics

Collected data were transformed into a digital database by using Microsoft Excel 2003, Microsoft Inc. (PC). All statistical analyses were performed by using statistical software package Statistica 10.0, StatSoft Inc. (licen-

ce MFOS). Numerical data distributed normally were presented as mean and standard deviation (SD) and those with skewed distribution – as median and interquartile range. Categorical data were presented as absolute frequences and percentages.

Differences between groups were assessed by using the one-way analysis of variance (ANOVA) and student's t-test for parametric distributions and analogous tests, Mann-Whitney U test and Kruskal-Wallis test, for non--parametric distributions. The categorical data analysis included the use of the Hi-kvadrat test and Fisher exact test where appropriate. The confirmed level of significance of $p < 0.05$ was considered statistically significant.

Results

Descriptive statistics

In the sample of 150 patients identified with IBD, those diagnosed with UC were predominantly represented, with 79.3% ($p < 0.001$, χ^2-test). Demographic data

TABLE 1

DEMOGRAPHIC CHARACTERISTICS OF PATIENTS WITH UC AND CD WITH χ^2-TEST RESULTS

	UC – Number/(%)	CB – Number/(%)	p
Distribution of subjects by gender			
M	57 (47.9)	20 (64.5)	=0.099*
F	62 (52.1)	11 (35.5)	
Distribution of subjects by marital status			
Married	90 (75.6)	15 (50.0)	=0.023†
Unmarried	17 (14.3)	11 (36.7)	
Divorced	3 (2.5)	1 (3.3)	
Widow(er)	9 (7.6)	3 (10.0)	
Distribution of subjects by resident status by a county of birth			
Immigrant			
To V-s County born	46 (38.7)	6 (19.4)	=0.044*
In V-s County	73 (61.3)	25 (80.6)	
Distribution of subjects by the level of education			
Primary school	28 (23.5)	5 (16.1)	=0.710†
Secondary school	71 (59.7)	21 (67.7)	
Vocational school	5 (4.2)	2 (6.5)	
University education	15 (12.6)	3 (9.7)	
Distribution of subjects by the employment status			
Employed	39 (32.8)	9 (29.0)	=110†
Self-employed	9 (7.6)	1 (3.2)	
Unemployed	17 (14.3)	3 (9.7)	
Retired	39 (32.8)	11 (35.5)	
Housekeepers	12 (10.1)	2 (6.5)	
Students	0 (0)	2 (6.5)	
High school students	3 (2.5)	3 (9.7)	
Total	119 (100)	31 (100)	

analysis showed significant differences, between two patient groups, in the following characteristics: 1) marital status (with higher percentage of married persons among those diagnosed with UC) and 2) resident status by a county of birth (with higher percentage of immigrants to V-s County among patients diagnosed with UC (Table 1). Patients diagnosed with CD were, in average, younger than those diagnosed with UC and showed a somewhat greater age variation skewed towards younger age groups (Figure 1).

Differences in distribution by age, between two patient groups, are in particular visible in Figure 2.

Close to the former results are the results showing distribution by age at the time of diagnosis (Figure 3). It can be concluded that the diagnosis of CD is confirmed, in average, in younger age groups, with the number of newly diagnosed cases prevailing in the second and the third decades of age. The number of cases newly diagnosed with UC is the highest and surpasses those with the diagnosis of CD in the fourth and the fifth decades of age.

The incidence and prevalence of UC and CD

In order to check our presumption that the incidence of IBD, in the Eastern Slavonia region, has increased in the period after the war in Croatia, we compared two
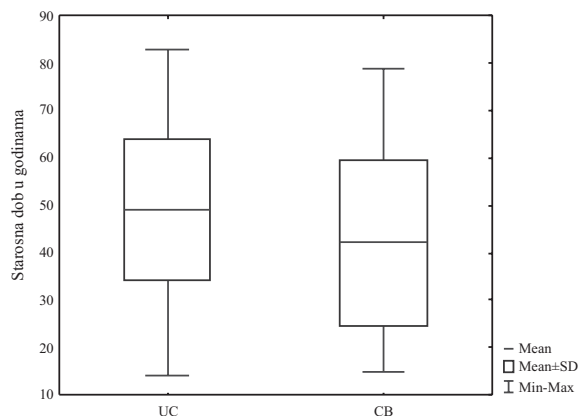

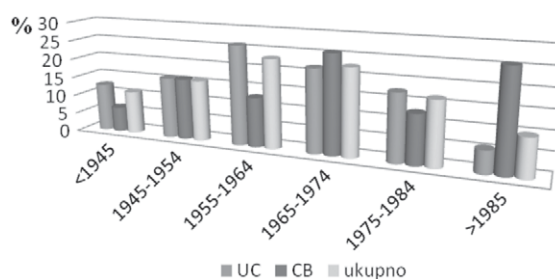
Fig. 1. Distribution by age (p=0.024; Student's t-test).

Fig. 2. Distribution by age of birth (p=0.045; Fisher's exact test).

TABLE 2

AN ABSOLUTE NUMBER OF NEWLY DIAGNOSED PATIENTS PER YEAR (THE INCIDENCE) AND A TOTAL NUMBER OF PATIENTS WITH THE DIAGNOSIS OF UC AND CD PER YEAR (PREVALENCE) IN V-S COUNTY

	UC – Number/(%)	CB – Number/(%)	p
Distribution of subjects by gender			
M	57 (47.9)	20 (64.5)	=0.099*
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High school students	3 (2.5)	3 (9.7)	
Total	119 (100)	31 (100)	

<table>
<tr><th colspan="4">TABLE 3
THE INCIDENCE RATES (100,000) OF UC BY COMPARING THE
PRE-WAR/WAR (1991–2000) WITH THE POST-WAR PERIOD
(2001–2010)</th></tr>
<tr><th>Years</th><th>The period during
the war
No/100,000</th><th>Years</th><th>The post-war
period
No/100,000</th></tr>
<tr><td>1991</td><td>0.5</td><td>2001</td><td>2.0</td></tr>
<tr><td>1992</td><td>1.0</td><td>2002</td><td>1.0</td></tr>
<tr><td>1993</td><td>1.0</td><td>2003</td><td>2.0</td></tr>
<tr><td>1994</td><td>0.5</td><td>2004</td><td>2.0</td></tr>
<tr><td>1995</td><td>1.5</td><td>2005</td><td>2.5</td></tr>
<tr><td>1996</td><td>1.0</td><td>2006</td><td>2.5</td></tr>
<tr><td>1997</td><td>0.0</td><td>2007</td><td>5.0</td></tr>
<tr><td>1998</td><td>2.0</td><td>2008</td><td>5.5</td></tr>
<tr><td>1999</td><td>1.5</td><td>2009</td><td>6.5</td></tr>
<tr><td>2000</td><td>1.0</td><td>2010</td><td>7.0</td></tr>
<tr><td>Average</td><td>1.0</td><td>Average</td><td>3.5</td></tr>
</table>

<table>
<tr><th colspan="4">TABLE 4
THE INCIDENCE RATES (100,000) OF CD BY COMPARING THE
PRE-WAR/WAR (1991–2000) WITH THE POST-WAR PERIOD
(2001–2010)</th></tr>
<tr><th>Years</th><th>The period during
the war
No/100,000</th><th>Years</th><th>The post-war
period
No/100,000</th></tr>
<tr><td>1991</td><td>0.0</td><td>2001</td><td>0.0</td></tr>
<tr><td>1992</td><td>0.5</td><td>2002</td><td>1.0</td></tr>
<tr><td>1993</td><td>0.0</td><td>2003</td><td>0.0</td></tr>
<tr><td>1994</td><td>0.5</td><td>2004</td><td>1.0</td></tr>
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<tr><td>1999</td><td>0.5</td><td>2009</td><td>1.0</td></tr>
<tr><td>2000</td><td>0.5</td><td>2010</td><td>2.0</td></tr>
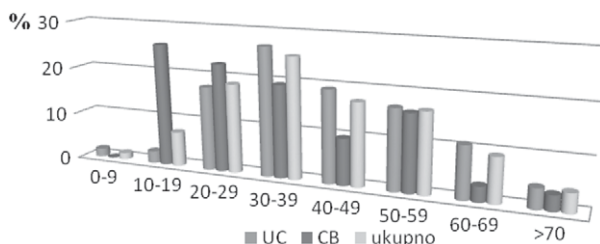<tr><td>Average</td><td>0.45</td><td>Average</td><td>0.95</td></tr>
</table>

Fig. 3. Distribution by age at the time of diagnosis (p=0,008;
Fisher's exact test).

10-year periods in relation to the incidence rates of IBD; the first one was from the beginning to the end of the war (1991–2000) (in 1998, the peaceful reintegration took the place) and the second one was the post-war period (2001–2010). The presumed hypothesis was confirmed, as the average values of the incidence rates of UC were significantly (3.5 times) higher for the post-war period (3.5/100,000) in comparison to the pre-war/war period (1.0/100,000) (Table 3). The hypothesis confirmation was also made for CD, because the average values of the incidence rates were 0.45/100,000 in the pre-war/war period and 0.95/100,000 in the post-war period, indicating two times increase of the average incidence rate in the post-war 10-year period.

Comparison of the incidence and prevalence data between V-s and P-g counties

The incidence and prevalence data for UC and CD were compared between V-S and P-G Counties for the period 1995–2001 for which the correspondent studies overlapped (Table 5 and 8). The average incidence rates for both diseases, UC and CD, were significantly higher in P-G then in V-S County (Table 5 and 6). Prevalence rates, through all the years of follow up and in the year 2001, in particular, when the highest prevalence rates had been reached, were also significantly higher in P-G County than in V-S County (Table 7 and 8).

<table>
<tr><th colspan="3">TABLE 5
COMPARISON OF THE INCIDENCE DATA FOR UC BETWEEN
V-S AND P-G COUNTIES</th></tr>
<tr><th>Years</th><th>Vukovarsko-Srijemska
County
No/100,000</th><th>Primorsko-goranska
County
No/100,000</th></tr>
<tr><td>1995</td><td>1.50</td><td>2.70</td></tr>
<tr><td>1996</td><td>1.00</td><td>4.12</td></tr>
<tr><td>1997</td><td>0.00</td><td>2.33</td></tr>
<tr><td>1998</td><td>2.00</td><td>3.47</td></tr>
<tr><td>1999</td><td>1.50</td><td>3.17</td></tr>
<tr><td>2000</td><td>1.00</td><td>5.43</td></tr>
<tr><td>2001</td><td>2.00</td><td>5.97</td></tr>
<tr><td>Average</td><td>1.29</td><td>3.88</td></tr>
</table>

<table>
<tr><th colspan="3">TABLE 6
COMPARISON OF THE INCIDENCE DATA FOR CD BETWEEN
V-S AND P-G COUNTIES</th></tr>
<tr><th>Years</th><th>Vukovarsko-Srijemska
County
No/100,000</th><th>Primorsko-goranska
County
No/100,000</th></tr>
<tr><td>1995</td><td>1.50</td><td>2.70</td></tr>
<tr><td>1996</td><td>0.00</td><td>4.49</td></tr>
<tr><td>1997</td><td>0.00</td><td>3.20</td></tr>
<tr><td>1998</td><td>1.00</td><td>2.60</td></tr>
<tr><td>1999</td><td>0.50</td><td>3.17</td></tr>
<tr><td>2000</td><td>0.50</td><td>5.71</td></tr>
<tr><td>2001</td><td>0.00</td><td>5.58</td></tr>
<tr><td>Average</td><td>0.50</td><td>3.92</td></tr>
</table>

TABLE 7
COMPARISON OF PREVALENCE DATA FOR UC BETWEEN
V-S AND P-G COUNTIES

Years	Vukovarsko-Srijemska County No /100,000	Primorsko-goranska County No /100,000
1995	7.00	20.99
1996	8.00	24.74
1997	8.00	26.48
1998	10.00	29.79
1999	11.50	32.54
2000	12.50	37.42
2001	14.50	53.90

TABLE 8
COMPARISON OF PREVALENCE DATA FOR CD BETWEEN
V-S AND P-G COUNTIES

Years	Vukovarsko-Srijemska County No /100,000	Primorsko-goranska County No /100,000
1995	2.50	14.93
1996	2.50	18.26
1997	2.50	21.25
1998	3.50	23.43
1999	4.00	26.21
2000	4.50	31.71
2001	4.50	46.40

TABLE 9
COMPARISON OF PREVALENCE OF UC AND CD BETWEEN
V-S COUNTY AND P-G COUNTY, 2001.

2001. year	Vukovarsko-Srijemska County No/ (%)	Primorsko-goranska County No/ (%)	p
UC	29 (76.3)	162 (53.8)	0.008*
CD	9 (23.7)	139 (46.2)	
Total	38 (100)	301 (100)	<0.001*

* – χ^2-test

Prevalence (expressed with%) were also compared between two counties by using data specifically for the year 2001, characterized with the highest prevalence reached in the period of surveillance. Results indicated that UC was predominant in V-S County while CD in P-G County, when comparison was made according to either of two diagnoses (for CD, 46.2%/23.7%, P-g/V-s County) and (for UC, 76.3%/53.8%, V-s/P-g County) (Table 9).

Discussion

The absolute number of cases with IBD registered in the last year (2012) in V-s County, North-Eastern Cro-

atia, counts 119 for UC and 31 for CD, indicating the predominant representation of UC over CD (Tables 1 and 2). The incidence rates (per 100,000) have been increasing for both diseases, equally partitioned, during the whole period of surveillance, and are significantly higher in the last decade (2001–2010) compared to the prior one (1991–2001) (Table 3 and 4). These facts seem to match well those ones obtained in the epidemiologic studies recently conducted in other countries of the South-Eastern Europe, including Hungary, Czech Republic, Romania and the north-eastern part of Poland[16–19]. Namely, as according to already known facts, in the last two decades, IBD has become more prevalent in these, previously low incidence areas of Europe, with UC still prevailing CD[5,8]. This is further in accordance with the general trend observed for developing countries all over the world, including also countries such as South Korea, China, Iran, or Lebanon[20–23].

Discussion on the demographic features analysis

Analysis of the demographic features of the subjects in the examined sample indicated that patients with UC were in average older than those with CD (Figure 1). This was further clarified by using distributions »by age of birth« and »by age at the time of diagnosis« (Figures 2 and 3). According to Figure 2, patients with the diagnosis of UC are predominantly represented in the fourth and the fifth decades of age, while patients with the diagnosis of CD have two peaks – one is the fourth decade and the other is younger than 28. These results may only be a reflection of those ones showing the prevalent age at the time of diagnosis (Figure 3). According to Figure 3, the number of subjects newly diagnosed with CD is the highest in the second and the third decades of age, while the corresponding age peaks for UC are the fourth and the fifth decades of age. In addition, the second age peak, for both diseases, can also be observed, situated in the age group of 60s (Figure 3). These results are in accordance with the widely cited data drawn from the epidemiologic studies conducted during the second half of the past century in developed areas of Europe and the world, including Denmark, Copenhagen City and County, Northern France, Canada, Olmsted County, Minnesota USA, and Canterbury County, New Zealand[24–29]. As cited in the literature, the peak age for the occurrence of CD is 20–30 years; for UC, it is 30–40 years. The second age peak for IBD, occurring around the age 60–70 years, is also mentioned in some studies[2]. Some more recent reports from developing countries support these earlier findings on the typical age peaks[16,20]. A delay in the time of a disease occurrence for UC, in our research sample (our findings are 40 and 50 years, instead of 30 and 40 years, as cited in the literature), can be explained by the intensive process of migration of the local population of V-s County during the war in Croatia. In this sense, displaced persons with the diagnosis of IBD might have been registered as newly diagnosed ones, once when they came back home, 10 years after the leaving[14].

Another conclusion that arises from the demographic features analysis is that married persons are more likely
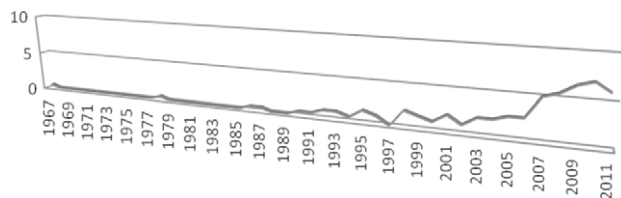
Fig. 4. The incidence rates of UC (the number of newly diagnosed cases per 100,000 per year).
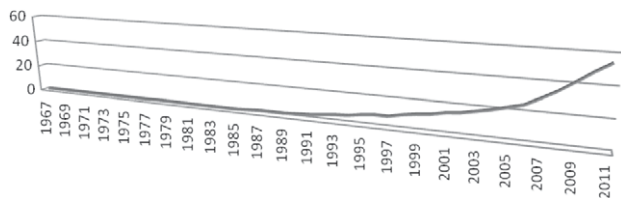

Fig. 5. The incidence rates of CD (the number of newly diagnosed cases per 100,000 per year).

Fig. 6. Prevalence of UC (a total number of persons with the diagnosis of UC per 100,000 per year).

Fig. 7. Prevalence of CD (a total number of persons with the diagnosis of UC per 100,000 per year).

to acquire UC, while it is not a matter of a concern among those with CD (for UC, 75.6 %/14.3 %, for CD 50.0 %/36.7 %, p=0.023) (Table 1). This conclusion may be only secondary to the results indicating younger age at onset of CD, than of UC. Otherwise, it could be a reflective of differences in lifestyles among married persons compared to not married ones and will require further confirmation. A risk of acquiring UC, but not CD, according to our results, is likely to be higher if a person is an immigrant (Table 1). This conclusion is in line with the results of epidemiologic studies performed elsewhere on migrant populations[30,31].

It can also be concluded, from our results, that males are more likely to suffer from CD (64.5%), than females (35.5%) (although the difference has not reached the significance level) (p=0.099) while in patients with UC, prevalence is equally distributed by sex (M 47.9%, F 52.1%) (Table 1). On the contrary to our results, as cited in the literature, CD occurs more frequently in women, particularly in high-incidence areas. However, a higher prevalence of CD among men is also likely to occur, typically in areas with the increasing incidence rates of IBD. In relation to UC, traditional view is that it is slightly more common in men, but recent studies, conducted worldwide, show rather variable results[9,24,25,32].

Discussion on the incidence and prevalence data analysis

The registration of patients with UC, in V-s County, have started in 1967; until 1992, new cases only been sporadically registered. During the period 1992–2005, the incidence maintained low-graded, varying from 1–4 of new cases per year. From 2005/2006 until now, it has been gradually increasing, with the maximal number of new cases counted 14 (7/100,000), in 2010 (Table 2, Fig-
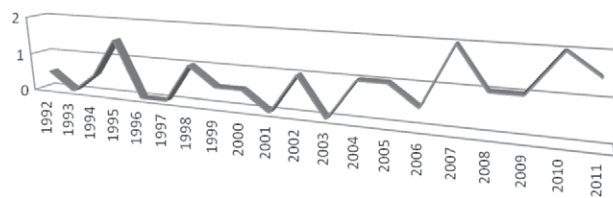
ure 4). These facts may mimic the history of the diagnostic procedure, which can generally be divided into a pre-endoscopic era, before 1970, an early endoscopic period, between 1970 and 1990, and a post-endoscopic period, from around 1990 until now[33]. A widespread distribution of equipments and skills of endoscopy enabled diagnostic procedures to be elsewhere performed, also leading to better IBD diagnosis registration and organisation of endoscopy-based studies. Some other factors, underlying these results, may include turbulent migration process taking place in V-s County during the last two decades and the effect of globalisation, in the last 5 years (since 2006)[8,9,14]. Concordant with the incidence data for UC, are prevalence data, the time-course of which is represented by the first small up-rise around the year 1991 and more significant increase after 2005/2006 (Table 2, Figure 6).
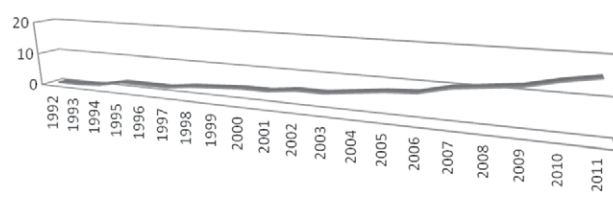
Registration of the incidence and prevalence data, for CD, in V-s County, can be followed up from 1992 until now (Table 2). The incidence time-course of CD maintains at a very low level (Figure 5). Prevalence of CD starts to increase around 2005/2006, keeping more slowly, in a linear form, in comparison to almost exponential increase in the case of UC. The difference is statistically significant (p<0.001) (Figure 6 and 7). These results, taken all together, are reflective of the predominant representation of UC, over CD, in V-s County.

The highest registered incidence rate, for UC, was 7.0/100,000 (2010) (Figure 4). The incidence rates show a rapidly increasing tendency during the past two decades, illustrated with the average incidence rate of 1.0/100,000 in the decade before (1991–2000) and of 3.5/100,000 in the last decade (2001–2010) (Table 3). Parallel data for CD indicate the highest incidence rate of 2.0/100,000

(2010) and an increase in the average incidence rate, from 0.45/100,000 in the period 1991–2000, to 0.95/100,000 in the period 2001–2010 (Table 4, Figure 5).

In meantime, prevalence rates, for UC, ranged from 7.0/100,000 (1995) to 48.5/100,000 (2010) (Figure 6), while those for CD, from 2.5/100,000 (1995) to 14.0/100,000 (2010) (Figure 7). As a comparison, prevalence rates (per 100,000) for UC, in Europe, varies from 21–294, and in North America, from 37.5–238. Prevalence rates, for CD, in Europe, varies from 8–214, and in North America, from 44–201[2]. Large variations of these numbers cited in the literature are likely to reflect a North to South, or developed to undeveloped countries gradient. The European IBD collaborative study (1991–1993) reported the incidence rates, for UC of 11.8, and for CD of 7.0, in Northern parts of Europe[5]. The general consensus is that there is a trend, in developed areas of the world, including North America, Canada and Northern Europe, for an increasing incidence for CD and stabilisation, although at a higher level, for the incidence of UC[25,26].

In some parts of Europe, the incidence rates for CD already exceed those for UC, such as in Northern France, showing the incidence rates of 6.4 for CD and of 3.5 for UC (1997–99), or, somewhat unexpectedly, in Greek (Southern Europe), with 36 new cases of UC and 40 of CD, registered in 2003[26,34]. Among the highest incidence rates for CD in the world, were reported in Canterbury County, New Zealand (2004), counting 16.5/100,000[24].

Based on these facts, the results obtained for V-s County are close to those ones reported for some other countries of South-Eastern Europe, including Hungary (the incidence rates for CD 2.2 and for UC 5.9) and Romania (0.5 and 0.9)[16,18].

Differences between counties

It is generally accepted that geographic and time variation in the incidence of IBD may be suggestive for changes in the distribution of risk factors[2,11]. Comparison of the results of this study, performed in the North-Eastern, continental part of Croatia, with the results of the study previously conducted in the coastal, P-g County, was made to check the presumption on the existence of a North-South gradient. This presumption was based on conclusions made upon the results of the European collaborative study on IBD, which indicated the higher overall incidence rates for UC and CD in northern centres, then in southern ones, a finding suggestive of an existence of a North-South gradient[5].

By comparing the results between two counties, this hypothesis has not been confirmed. Significantly higher incidence rates have been registered in P-g County compared to V-s County, for both diseases, UC and CD (UC 3.88/1.29 and CD 3.92/0.5 respectively) (Table 5 and 6).

Comparison of prevalence rates yielded similar results, indicating higher rates in P-g County (South), than in V-s County (North) (5.9/14.5 and 46.4/4.5, for UC and CD respectively) (Table 7 and 8). These results are in an opposite to the postulates of the North-South hypothesis. Moreover, when absolute prevalence values were taken and compared, it could be observed that there was a significantly higher percentage of patients with CD in P-g County (South) than in V-s County (North) (46.2/23.7%), the fact that does not support the existance of the North-South hypothesis (Table 9). In fact, the distribution pattern of IBD for P-g County, by indicating almost equal ratio between UC and CD (53.8% and 46.2%), is more similar to the pattern observed in developed European countries (Table 9). The pattern obtained for V-s County, still having low prevalence rates, with the dominance of UC over CD, is likely to follow the patterns of developing countries. This latter hypothesis is also supported, although only indirectly, by the results of the similar study recently performed in this area, in the neighbouring Osječko-Baranjska County, indicating a high portion of people of the general population (29.16% in average) with symptoms of a functional bowel disorder, known as irritable bowel syndrome[35].

Conclusions

This is the first epidemiologic study on IBD performed in the continental part of Croatia and one of a few done at all in the area of South-Eastern Europe. The results confirmed the clinical observation that the incidence and prevalence of IBD significantly increased in the last decade, 2001–2010, compared with what was found in the decade before, 1991–2000, probably reflecting the general trend of globalisation. Although increasing, incidence and prevalence rates are still lower than those reported in developed European countries. This fact and the prevailing participation of UC over CD, place V-s County into a group of developing areas of Europe and broader. The results of this study also allowed comparison with the results of the first Croatian epidemiologic study on IBD, but performed in the coastal part of Croatia, differing in climate and latitudes from V-s County. Higher incidence and prevalence rates for IBD, in P-g County, compared with V-s County, with UC and CD being equally partitioned, is more close to developed European countries. Taken together, these results indicate that differences between these two counties reflect the difference between the more developed West (P-g County) and the less developed East (V-s County) of Croatia and do not confirm the initially presumed North-South hypothesis, based on differences in geography and climate.

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INCIDENCIJA I PREVALENCIJA KRONIČNIH UPALNIH BOLESTI CRIJEVA U VUKOVARSKO-SRIJEMSKOJ ŽUPANIJI, HRVATSKA, 1991–2000 I 2001–2010; POPULACIJSKA STUDIJA

S A Ž E T A K

Za upalne bolesti crijeva, IBD, Cronovu bolest (CD) i ulcerozni kolitis (UC), retrospektivnim putem su ispitivane incidencija i prevalencija, u Vukovarsko-srijemskoj županiji, kontinentalna Hrvatska. Ukupno je bilo 150 pacijenata, 119 s UC i 31 s CD. Od njih, 79,3% su bili s UC, što je ukazivalo na predominantu zastupljenost UC u ispitivanom uzorku. Usporedba ispitivanog razdoblja, 2000–2010, s prethodnom dekadom, 1991–2000, je pokazala značajan porast stopa incidencije za obje bolesti, UC i CD (UC 3,5, CD 0,95, 2001–2010, te UC 1,0, CD 0,45, 1991–2000). Usporedba ovog istraživanja s istraživanjem obavljenim u Primorsko-goranskoj županiji, priobalna Hrvatska, je pokazala različit uzorak distribucije IBD. U Primorsko-goranskoj županiji, zapažene su značajno više stope incidencije i prevalencije za UC i CD, te podjednak omjer između te dvije bolesti. Dobiveni rezultati se mogu protumačiti razlikama između razvijenijih zapadnih i manje razvijenih istočnih dijelova Hrvatske.