

IS THERE A TERRITORIAL DIFFERENTIATION IN THE PREVALENCE OF PEPTIC ULCER AMONG RURAL POPULATION IN POLAND?

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Abstract: The aim of this study was to determine the prevalence of peptic ulcer among rural population in various regions of Poland and to analyse the conditions influencing the prevalence of the disease. For organizational reasons, the division of the territory of Poland into eight regions was adopted for the study. The study covered a representative group of 6,512 rural inhabitants, comprising 3,107 males (47.7%) and 3405 women (52.3%), aged 20–64, selected by two-stage stratified sampling. At the first stage of the study all health centres (3,286) were classified into 150 groups and in each group two prevention-treatment regions were selected by means of stratified sampling. The second-stage samples were selected based on communes where the health centres classified for the study were located. People selected for the study were subject to examinations which covered: a specially designed questionnaire form, detailed physical examination, and the necessary specialist tests. The obtained results were recorded in a questionnaire form, which additionally contained questions concerning detailed demographic and social data, hazardous factors present in the working environment, as well as data pertaining to housing conditions, nutrition and habits. Among the rural population under study, peptic ulcer was found in 8.0% of males and 2.9% of females, gastric ulcer was observed in 1.2% of people under study, duodenal ulcer - in 3.2%, gastric and duodenal ulcer - in 0.2%, whereas patients who underwent surgical procedures due to peptic ulcer constituted 0.7% of respondents. Territorial differences were noted in the prevalence of peptic ulcer among Polish rural population. The highest peptic ulcer incidence rates were observed in Macroregion I (western Poland) - where the disease was diagnosed in 7.2% of people under study (Northern Region - 8.1%, Southern Region - 7.4%, and South-Western Region - 6.4%), while the lowest rates were noted in Macroregion II (central and eastern Poland), where peptic ulcer occurred among 4.7% of respondents (South-Eastern Region - 4.4%, North-Eastern Region - 4.5%, Middle-Eastern Region - 4.7%, Middle-Western Region - 4.8%, and Central Region - 5.1%). In regions where the highest incidence rates were noted, the greatest numbers of divorcees, widows and widowers were observed. An analysis by occupational groups showed that in these regions there were more unskilled and skilled workers, employees of services, and the largest number of people performed non-agricultural occupations. Cigarette smoking habit was also more prevalent in these regions.

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INTRODUCTION

Due to the high prevalence of gastric and duodenal ulcer this disease is considered to be of social importance

and belongs to the most frequently diagnosed diseases of the alimentary tract [1, 7, 9, 10, 13, 18, 21, 23, 24, 29].

The reports concerning the occurrence of peptic ulcer published in Poland to date show great differences in

opinions concerning the prevalence of this disease [2, 3, 6, 7, 8, 9, 14, 19, 23, 24]. Based on the representative studies of visits to doctors, conducted during 1967-1968, Branowitz [3] estimated the prevalence of peptic ulcer among rural inhabitants as 0.99% in males, and 0.11% in females, whereas among urban population - 2.03% in males and 0.52% in females. During the subsequent years, Modzelewski *et al.* [15] in the study of rural population aged over 60, diagnosed peptic ulcer in 7.6% of males and 5.2% of females. Rużyło *et al.* [21] in their studies of the natural history of peptic ulcer in Poland, confirmed that farmers and horticulturists made up 8.2% of the total number of patients with peptic ulcer. Gaertner *et al.* [7] found that peptic ulcer occurred in 14% of the population living in villages near Kraków (Cracow).

A considerably larger number of studies were devoted to the prevalence of peptic ulcer among urban population [2, 6, 8, 9, 19, 24]. In these studies, big differences in the evaluations concerning the incidence of peptic ulcer are also observed. Bożyk [2] estimated that approximately 20% of the workers of Polish Railways suffered from peptic ulcer. Popiela *et al.* [19] in their examinations of employees of industrial enterprises in south-eastern Poland diagnosed this disease in 7% of the workers examined. Jędrychowski *et al.* [9] conducted studies among workers of the Cracow Measurement Producing Factory and estimated that peptic ulcer occurred in 7.2% of males and 3.2% of females. Studies carried out among the inhabitants of Łódź during 1978-1980 showed that peptic ulcer was diagnosed in 5.9% of males and 4.2% of females [8]. The disease was also noted among 2.8% of sailors from the Polish Merchant Marine [6], and a similar incidence of peptic ulcer was observed among workers of factories in Puławy and Lublin [24].

It has been assessed that in West European countries about 10% of the adult population suffers from peptic ulcer [1, 13, 18]. Reports from 1992 estimate the occurrence of peptic ulcer in the USA as 10-11% in males and 7-8% in females [13]. The situation is similar in Norway - 10.5% of males and 9.5% of females [1]. A very high incidence of peptic ulcer (20%) was confirmed by Lindstrom [14] in postmortem examinations.

In the majority of countries in the world, duodenal ulcer occurs significantly more often than gastric ulcer [1, 18, 23]. In northern Norway gastric ulcer was diagnosed as frequently as duodenal ulcer [10, 17], whereas in Japan gastric ulcer was more often observed [29]. In the developing countries (Ethiopia, India) duodenal ulcer occurs significantly more often than gastric ulcer, the latter being very rarely diagnosed [16, 28].

The data presented above show that there are great differences in the occurrence of peptic ulcer both in Poland and abroad. In Polish literature there is a lack of reports concerning the territorial differentiation in the incidence of peptic ulcer. Therefore it seemed justified to evaluate the prevalence of peptic ulcer among rural population in various regions of Poland and to analyse its conditioning.

MATERIALS AND METODS

The study was based on the results of all-Polish comprehensive survey (considering somatic, mental and social aspects of health) of adult rural inhabitants, which was conducted by the Institute of Agricultural Medicine in Lublin in 1990 [4, 27].

For organizational reasons, the territory of Poland was divided into the following eight regions [5]:

1. Central Region (former regions of: Warsaw, Ciechanów, Łódź, Piotrków, Płock, Sieradz, Skierniewice, and Radom);
2. Middle Eastern Region (former regions of: Białą Podlaska, Chełm, Lublin, Siedlce, and Zamość);
3. Middle Western Region (former regions of: Toruń, Włocławek, Piła, Poznań, Konin, Kalisz, and Bydgoszcz);
4. South Western Region (former regions of: Gorzów, Jelenia Góra, Legnica, Leszno, Wałbrzych, Wrocław, and Zielona Góra);
5. Southern Region (former regions of: Bielsko Biała, Częstochowa, Katowice, and Opole);
6. South Eastern Region (former regions of: Kraków, Tarnobrzeg, Tarnów, Rzeszów, Kielce, Krosno, Nowy Sącz, and Przemyśl);
7. North Eastern Region (former regions of: Białystok, Łomża, Olsztyn, Ostrołęka, and Suwałki);
8. Northern Region (former regions of: Gdańsk, Elbląg, Koszalin, Słupsk and Szczecin).

The study covered a representative group of rural population selected by two-stage sampling. Records from all rural health centres in Poland (3,286) containing 34 parameters, which are kept and annually updated by the Institute of Agricultural Medicine in Lublin, were used for the first-stage sampling. At the first stage of the study all health centres were divided into 150 groups according to their location, type of centre, distance to Health Unit (hospital), number of population in the region, percentage of farming population and deviation from the recommended model of employment. In each group two prevention-treatment regions were selected by means of stratified sampling and a required sample of 300 first-stage units was obtained. The second-stage samples were selected based on communes, where the selected health centres were located, and covered the population aged 18-64. According to the region and sampling probability the size of the sample ranged from 10-120 people from one health centre. A total number of 8,091 rural inhabitants were selected of whom 7,006 respondents, i.e. 86.6% were classified for the study (the remaining people did not report for examinations). The two youngest age groups (18-19) were excluded from further analysis as not sufficiently representative ($p < 0.001$). These deviations most probably resulted from the inadequacy of the 1988 lists of voters (people who reached the age of 18 were not always enrolled on the lists). As many as 6,846 people were finally classified for statistical analysis, including 6,512 rural inhabitants aged 20-64 with a correctly

completed Medical Examinations Chart. The latter sample was analysed in the present paper.

The study was conducted by trained rural health centre physicians and covered: filling in of a specially designed questionnaire, a detailed physical examination, and necessary specialist tests. The obtained results were recorded in a questionnaire, which also contained questions concerning detailed demographic and social data, hazardous factors present at the workplace, as well as data pertaining to housing conditions, way of nutrition and habits.

Chi² test was applied for statistical analysis. Values expressed as percentages were compared by the test of significance of the differences between fractions. The value of $p < 0.05$ was adopted as a basic level of significance.

RESULTS

At the time of the study, rural inhabitants constituted 38.6% of the total number of Polish population, i.e. 14,623,000 people [20]. Among rural population examined, peptic ulcer occupied the fifth position with respect to the frequency of occurrence (5.3%), preceded by arteriosclerosis (13.2%), arterial hypertension (11.6%), ischemic heart disease (9.8%), and varicosis of the lower extremities (7.2%). The disease was noted in 8.0% of males and 2.9% of females. Gastric ulcer was diagnosed in 1.2% of the population under study, duodenal ulcer - in 3.2%, gastric and duodenal ulcer - in 0.2%, while patients who underwent surgical procedures due to peptic ulcer made up 0.7% of the people examined.

Table 1 and Figure 1 present the occurrence of peptic ulcer among rural population in the economic regions in Poland. Differences were observed in the prevalence of peptic ulcer in individual regions in Poland. The highest peptic ulcer incidence rates were noted in the following regions: Northern (8.1%), Southern (7.3%), South-Western (6.4%), whereas the lowest rates were noted in the South-Eastern Region (4.4%), North-Eastern Region (4.5%), and Middle-Eastern Region (4.8%).

Regions in which the incidence of peptic ulcer was above the average value for the whole country - 5.3% (Northern, Southern, South-Western) created Macroregion I of high morbidity. This Macroregion covered 1,679 respondents, and peptic ulcer was diagnosed in 121 people (7.2%). The remaining regions (South-Eastern, North-Eastern, Middle-Eastern, Middle-Western, Middle) were considered as Macroregion II of low morbidity. This Macroregion covered 4,833 people in the study, 227 of whom had peptic ulcer (4.7%).

Table 2 presents a compilation of patients with peptic ulcer and those with other diseases, as well as a group of healthy individuals according to place of residence (Macroregion). It was observed that the prevalence of peptic ulcer was statistically greater among rural inhabitants of Macroregion I (7.2%), compared to rural population from Macroregion II (4.7%). In addition, in

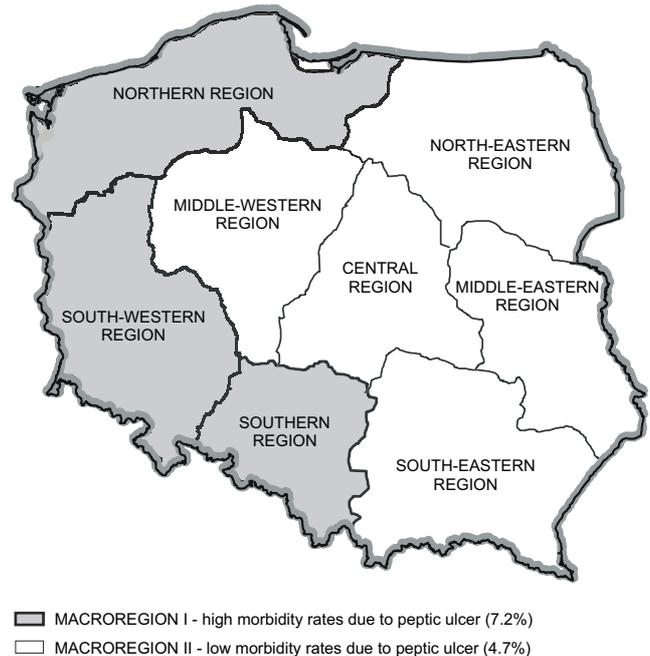


Figure 1. Prevalence of peptic ulcer among Polish rural population according to regions.

Macroregion I the number of people with other diseases was also higher than in Macroregion II (58.0% and 57.3% respectively), while the number of healthy individuals was smaller (34.8% and 38.1% respectively). These differences are statistically significant ($p < 0.001$).

The difference observed in the prevalence of peptic ulcer among inhabitants of Macroregions I and II constituted basis for the analysis of selected demographic and social features and the evaluation of cigarette smoking in both populations.

The structure of the above-mentioned Macroregions was compared by the following descriptive variables: gender, age, marital status, level of education, occupation, source of maintenance, association with agriculture, subjective evaluation of economic standard, and prevalence of cigarette smoking. It was noted that the inhabitants of the selected Macroregions did not significantly differ with respect to following variables:

- gender ($\text{Chi}^2=0.72$, $\text{df}=1$, $p=0.40$); nevertheless, in Macroregion I of high morbidity rates due to peptic ulcer, a slightly higher percentage of females was observed, compared to Macroregion II (48.6% versus 47.4%), whereas the percentage of males was lower (51.4% versus 52.6%).
- 15-year age groups ($\text{Chi}^2 = 5.72$, $\text{df} = 2$, $p = 0.057$); in Macroregion I of high morbidity rates, however, a slightly higher percentage of people aged 20-34 was observed, compared to Macroregion II (37.8% versus 35.2%), while the lowest percentage was noted in the oldest age group (30.6% versus 33.5%).
- subjective evaluation of economic standard ($\text{Chi}^2=5.66$, $\text{df} = 2$, $p = 0.06$).

Table 1. Prevalence of peptic ulcer among rural population in the economic regions of Poland.

Region	Patients with peptic ulcer		Remaining people examined		Total	
	N	%	n	%	N	%
Northern	41	8.1	464	91.9	505	100
Southern	40	7.3	509	92.7	549	100
South-Western	40	6.4	585	93.7	625	100
Central	45	5.1	830	94.9	875	100
Middle-Western	49	4.8	965	95.2	1,014	100
Middle-Eastern	43	4.7	871	95.3	914	100
North-Eastern	24	4.6	503	95.4	527	100
South-Eastern	66	4.4	1,437	95.6	1,503	100
Total average	348	5.3	6,164	94.7	6,512	100

Table 2. Compilation of patients with peptic ulcer, those with other diseases, and healthy individuals by place of residence (Macroregion).

Macroregion	Patients with peptic ulcer		Patients with other diseases		Healthy individuals		Total	
	N	%	N	%	N	%	N	%
I (high morbidity)	121	7.2	974	58.0	584	34.8	1,679	100
II (low morbidity)	227	4.7	2,767	57.3	1,839	38.1	4,833	100

$\text{Chi}^2 = 18.39$, $\text{df} = 2$, $p < 0.001$

Table 3. Compilation of the site of ulcer among patients from Macroregions of high and low peptic ulcer morbidity rates.

Macroregion	Site of ulcer								Total	
	Gastric ulcer		Duodenal ulcer		Gastric and duodenal ulcer		Patients who underwent surgical treatment due to peptic ulcer		N	%
	N	%	N	%	N	%	N	%	N	%
I	31	25.6	69	57.0	5	4.1	16	13.2	121	100
II	46	20.3	139	61.2	11	4.8	31	13.7	227	100

$\text{Chi}^2 = 1.35$, $\text{df} = 3$, $p = 0.7$

Statistically significant differences were observed, however, for such variables as: level of education, occupational group, source of maintenance, association with agriculture, and prevalence of cigarette smoking. Among the population of Macroregion I of high morbidity rates, a greater number of the following people with peptic ulcer was noted compared to Macroregion II:

- divorcees (1.9% versus 1.2%), widows and widowers (5.6% versus 4.3%); and a lower number of married

males and females (78.3% versus 79.6%), never-married males and females ($\text{Chi}^2 = 8.26$, $\text{df} = 3$, $p < 0.05$);

- people with basic vocational education level (33.1% and 27.4%); and a smaller number of those without any or with an incomplete elementary education (7.5% and 9.2%), with elementary education (41.3% versus 43.5%), with secondary and/or college education (16.1% versus 17.3%), and with university education (2.0% versus 2.6%) ($\text{Chi}^2 = 22.51$, $\text{df} = 4$, $p < 0.001$);
- unskilled workers (21.8%, compared to 14.2%) and skilled workers (23.7% versus 14.7%), employees of services (16.3% versus 11.2%), office workers and intelligentsia (15.8% versus 14.8%), while the percentage of private farmers was smaller (22.4% versus 45.1%) ($\text{Chi}^2 = 215.7$, $\text{df} = 4$, $p < 0.001$);
- people who maintained themselves on non-agricultural sources (66.0% versus 43.2%), and a smaller number of those who lived on agricultural sources (34.0% versus 56.8%) ($\text{Chi}^2 = 256.6$, $\text{df} = 1$, $p < 0.001$);
- non-agricultural workers (49.5% versus 31.8%) and those not occupationally active (23.6% versus 18.3%), while the percentage of people performing agricultural occupations was smaller (18.7% versus 38.8%), as well as the number of those who were engaged in both agricultural and non-agricultural work (8.1% versus 11.2%) ($\text{Chi}^2 = 281.8$, $\text{df} = 3$, $p < 0.001$);
- smokers (44.2% versus 36.6%), while the percentage of never-smokers and ex-smokers was smaller (46.0% versus 52.7% and 9.8% versus 10.6% respectively) ($\text{Chi}^2 = 30.1$, $\text{df} = 2$, $p < 0.001$);

Table 3 presents a compilation of the sites of ulcer among inhabitants of Macroregions I and II. In Macroregion I (of high morbidity rates) a slightly higher incidence of gastric ulcer was observed, compared to Macroregion II (25.6% versus 20.3%), whereas duodenal ulcer, as well as gastric and duodenal ulcer were more rarely noted (57.0% versus 61.2% and 4.1% versus 4.8% respectively). These differences, however, were not statistically significant.

DISCUSSION

The results of the studies confirmed the territorial differentiation in the prevalence of peptic ulcer among Polish rural inhabitants. Statistically significant differences were observed in the occurrence of peptic ulcer between Macroregion I (Western Poland) and Macroregion II (Central and Eastern Poland). The prevalence of peptic ulcer was higher in Macroregion I (7.2%) than in Macroregion II (4.7%).

Statistically significant differences were also noted between inhabitants of Macroregions I and II with respect to the following variables: marital status (a greater number of divorcees, widows and widowers), occupational group (a greater number of unskilled and skilled workers, as well as office employees, and a smaller number of private farmers), and the prevalence of

cigarette smoking (a greater number of smokers). The observed differences may possibly justify changes in morbidity rates due to peptic ulcer noted between the Macroregions in the study [16, 22, 23, 24, 26].

In Polish literature to date there are no reports indicating the regional differentiation in the occurrence of peptic ulcer. The extant reports present only the differences in hospital morbidity and mortality [12, 30]. It was observed that mortality rates were lower in the eastern part of the country, compared to western Poland. Attempts were undertaken to explain these differences by a higher level of industrialization in the western areas and, associated with this, a different lifestyle, predisposing to the occurrence of peptic ulcer [11]. Branowitz [3], and Popiela *et al.* [19] observed that peptic ulcer was more prevalent among urban than rural population.

Reports by foreign authors show also differences in morbidity due to peptic ulcer according to regions. Moshal *et al.* [16] noted higher morbidity rates due to duodenal ulcer among inhabitants of the southern part of India, compared to the north. Ostensen *et al.* [17] showed that the incidence of gastric ulcer was significantly higher in northern Norway. Also, Polynard *et al.* [18] in France, and Saito *et al.* [22] in Japan, observed territorial differences in peptic ulcer incidence rates. There were attempts to explain the territorial differentiation in the occurrence of peptic ulcer by different environmental and climatic conditions, prevalence of cigarette smoking, nutritional habits and the level of industrialization [16, 17, 18, 22, 24, 26].

Since the discovery of *Helicobacter pylori* by Warren and Marshall [31], attitudes towards the etiology, pathogenesis and treatment of peptic ulcer has changed radically. It was confirmed that *Helicobacter pylori* is the most important peptic ulcer etiologic and pathogenic factor [25]. Therefore, despite the lack of proper studies, it may be presumed that the territorial differences observed in the occurrence of peptic ulcer among rural population may also be due to an unequal prevalence of *Helicobacter pylori* in Poland.

CONCLUSIONS

1. A relationship was observed between the prevalence of peptic ulcer among rural population in Poland and the region of residence.

2. The highest peptic ulcer incidence rates were noted in Macroregion I (Western Poland), where peptic ulcer occurred in 7.2% of the population examined (Northern Region - 8.1%, Southern Region - 7.4% and South-Western Region - 6.4%).

3. The lowest peptic ulcer incidence rates were observed in Macroregion II (central and eastern Poland), where the disease was diagnosed in 4.7% of people in the study (South-Eastern Region - 4.4%, North-Eastern Region - 4.5%, Middle-Eastern Region - 4.7%, Middle-Western Region - 4.8%, and Central Region - 5.1%).

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