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DYNAMICS OF FLUE MORBIDITY AMONG THE POPULATION OF ZHYTOMYR REGION

O. Boyalska[1], I. Kyrychuk[2], O. Shpyta[3], A. Boyko[1,4]

[1] Київський національний університет імені Тараса Шевченка
[2] Головне управління Держсанепідслужби України у Житомирській області
[3] Житомирське міськрайонне управління Головного управління Держсанепідслужби України у Житомирській області
[4] Інститут агроекології і природокористування НААН

Проаналізовано захворюваність на грип населення Житомирської обл. у розрізі районів за 15 років (1999–2013). Динаміка захворюваності на грип у деяких районах області відзначалася загальними закономірностями, а іноді характеризувалась індивідуальними особливостями. Захворюваність на грип населення Житомирської області досліджуваних районів за останні 15 років набула тенденцію до зниження (3754,7 на 100 тис. населення у 1999 р. до 396,87 на 100 тис. населення у 2013 р.). Виявлені закономірності у територіальному розподілі захворюваності на грип у районах залежать від кількості населення.

Ключові слова: *захворюваність, екологічні регіони, грип, ГРВІ.*

Influenza-like illnesses (ILI), a subset of acute respiratory infections (ARI), are a leading cause of morbidity and mortality worldwide [1, 2]. Every year 10–14 million of people in Ukraine suffer from ARI, representing 25–30% of the total and about 75–90% of infectious morbidity in the country [3].

In etiological structure of acute respiratory disease the largest share belongs to viruses. To date, approximately 200 respiratory viruses are known The main clinical manifestations of infectious diseases include fever and intoxication syndrome, which requires differential diagnosis for further diagnosis. Among these viruses the most well-recognized respiratory viral pathogens are seasonal influenza virus A and B (sFluA and sFluB), parainfluenza virus (PIV), human metapneumovirus (HMPV), respiratory syncytial virus (RSV), and adenovirus (ADV) [1, 2, 4].

Seasonal influenza and other acute respiratory viral infections morbidity rises (ARVI) are characterized with mixed etiology, in which the share of influenza varies more widely. This situation occurs because there are several influenza virus serotypes through which in spite of the fact that after the disease a strong immunity is formed, other serotypes of influenza can be transmitted [5–8]. Because of this variability influenza virus remains a very important epidemic pathogen. According to the World Health Organization (WHO), there are 3–5 million severe cases and 250.000–500.000 deaths globally due to influenza annually. Pandemics occur every 10–50 years [5] and usually occur in waves and can continue until 1,5–2 years, sometimes covering 9–10 months and 30% of the world population [6–10].

Influenza and other ARVI occur in the form of outbreaks and epidemics, alternating with periods of sporadic disease. Duration is determined by the intensity of the epidemic process. Therefore, an important role to monitor the intensity of the epidemic process should belong to epidemiological and virological surveillance of influenza and other ARVI in certain areas of the country that will allow quick assess the situation and carry out preventive (antiepidemic) measures.

Thus, the aim of our study is comparison of influenza-induced morbidity among the population of Zhytomyr region and Ukraine in whole, between the districts of the region during 1999–2013.

MATERIALS AND METHODS

The information and statistical data of the Main Department of State Sanitary and Epidemiological Service of Ukraine in Zhytomyr region, State Institution «Zhytomyr regional laboratory center of State Sanitary and Epidemiological Service of Ukraine», the Central Statistical Office in Zhytomyr region from 1999 till 2013 («Report on certain infections and parasitic diseases» approved by Order No. 378 of 02.06.2009 of Ministry of Health Ukraine in the context of the districts during 1999–2013 — reporting forms on the annual morbidity — f.2 and monthly morbidity — f.1, distribution of the resident population of Zhytomyr region by gender and age were used).

RESULTS AND DISCUSSION

The Zhytomyr region has 23 administrative districts, 11 cities, including 5 cities of regional subordination (Zhytomyr, Berdychiv, Korosten, Malyn, Novograd –Volynsky), 43 towns and 1613 villages. Zhytomyr is regional center.

For comfort of demonstration of analysis of influenza-induced morbidity in population in 23 districts of the Zhytomyr region data of 3 large by population districts were taken (Zhytomyr (68.0 thousand people), Ovruch (60.7 thousand people), Novograd-Volynsky (48.7 thousand people), 3 small (Brusyliv (16.1 thousand people), Luhyny (17.9 thousand people), Narodychi (9.6 thousand people) and 3 large cities (Zhytomyr (270.5 thousand people), Berdychiv (79.3 thousand people), Korosten (65.7 thousand people).

Dynamics of influenza in Zhytomyr region during 1999–2013, as well as in Ukraine in general, are characterized by certain cycles — ups that change into downs (Fig. 1). In our opinion, this is due to the peculiarities of the transmission mechanism, as population immunity and changes in the antigenic determinants of pathogens, particularly influenza virus (drift and shift). In Zhytomyr region, as well as in Ukraine in whole annually seasonal influenza epidemic rises were registered. It is almost the only respiratory infection that has clearly expressed seasonality.

The intense fading rates of the influenza epidemic process were identified as a result of the retrospective analysis in Zhytomyr region during 15 calendar years in the region of 3754.7 per 100000 of population (1999) to 396.87 per 100000 of population (2013). This fact may be associated with changes in social economic factors in our country (rising unemployment, change of ownership, population reduction) which had a significant impact on reducing public appeals for medical help, therefore, resulted in a decrease of registered morbidity.

Increase in incidence that occurred during the last 15 years of follow were small, even in 2008–2009 (Int. Indicator 2092.17–1595.75 per 100000 of population) was less than at the beginning of this observation. After the relatively epidemiologically safe situation of the previous years in 2009 a new pandemic appeared that caused a great interest in the problem of influenza features. It was caused by a new influenza virus antigenic characteristic of A (H1N1). In epidemic process people of working age from 21 to 50 years old, that is younger generation with low immunity, suffered. Throughout the world a very high number of cases of influenza (especially lethal) were expected approximately as the pandemic in 1918–1919 because the pandemic virus H1N1 2009 contains hemagglutinin gene (HA), which is derived from the classical H1N1 swine line and antigenically similar with 1918 influenza virus. Pandemic of 21st century was much easier than it had been

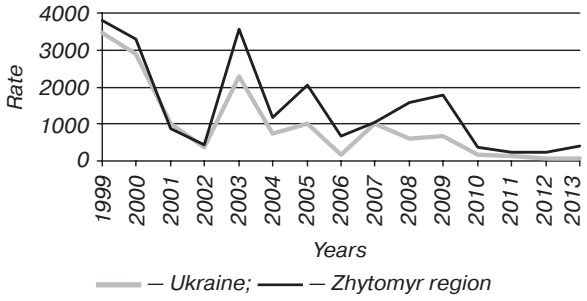

Fig. 1. Dynamics of flue morbidity among the population of Zhytomyr region during 1999–2013 (rate of morbidity per 100000 of population)

expected, and mortality was compared with seasonal influenza. As shown in Figure 1 for the last four years after the pandemic epidemic situation stabilized, as in Zhytomyr region and in Ukraine in general.

The highest rates of influenza morbidity among the population of represented areas were in Novograd-Volynsky and Ovruch districts (Fig. 2, *b*), and the lowest ones were in Brusyliv district (Fig. 3, *a*). Among the major cities in the region the highest indicators were in Korosten (Fig. 2, *a*).

Indicators of flue morbidity among the population of districts coincide with the course of morbidity in Zhytomyr region in whole, and in some years exceed approximately 1.5 times. The highest rates of flue morbidity among the population of Ovruch district (4941 and 5453.5 per 100000 of population respectively) were in 2000 and 2003. And in 2005 and 2009 the highest ones were in Novohrad-Volynsky (3734.67 and 2829.12 per 100000 of population respectively).

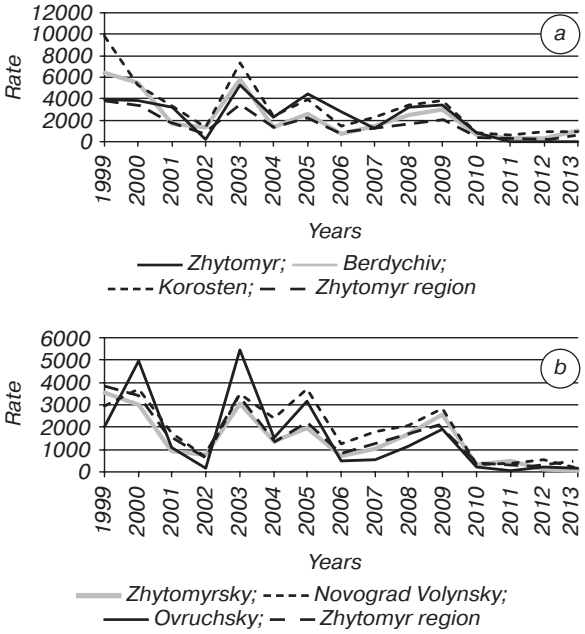

Fig. 2. Dynamics of flue morbidity in population of cities (*a*) and large districts by population (*b*) in Zhytomyr region and in the region in whole during 1999–2013 (rate of morbidity per 100000 population)

We believe that such high rates of influenza morbidity were caused by a large congestion of population, well-developed transport line both railway and automobile, which favoured the process of migration of people. Due to these factors the influenza virus can come from other districts, regions and countries. Zhytomyr region borders on Rivne, Khmelnytsky, Vinnytsia and Kyiv region and the Republic of Belarus.

The incidence of influenza in the population Brusyliv, Lugynsk and Narodychi districts with low intensity indicators, and in some years, such as 2002, 2006, 2007, 2009, 2011, 2012, 2013, was zero (Fig. 3, *a*). We believe that this can not be. This suggests the problem of diagnosis or registration of this infection. This view is confirmed by the wide spread of ARVI in these areas, which are similar in clinical manifestations of influenza (int. indicator to 3544.1 till 9005.9 per 100000 of population) in three districts. The intensive indicator of morbidity rate of ARVI which equals zero, isn't presented in any year (Fig. 3, *b*).

High rates of flue morbidity in small districts by population were Narodychi in 2000 and 2003 (4677.3 per 100000 of population and 4895.5 per 100000 of population, respectively), exceeding the regional ones approximately 1.5 times. It's necessary to note that in these years there were the greatest indicators in Ovruch district (Fig. 3, *a*). Narodychi and Ovruch districts of Zhytomyr region were the most affected by the Chernobyl nuclear disaster that possible had an impact on population susceptibility to influenza virus. These districts border on each other and the Republic of Belarus. Probably influenza virus was imported from abroad or from other districts of Zhytomyr and Kyiv regions, which they border on.

Thus it was confirmed that the highest incidence of influenza in the cities and districts of Zhytomyr region, where there is a large population congestion, intense processes of

migration of people and a large number of industrial enterprises (Fig. 2–3, *a*, *b*).

Epidemiological data describing the manifestation of the epidemic process of influenza, allow conducting preventive and control measures in time. This in turn helps to reduce the morbidity of influenza among the population of Zhytomyr region.

CONCLUSIONS

Analysis of the data shows that flue morbidity among the population of Zhytomyr region over the past 15 years has gained a tendency to decrease (3754.7 per 100000 of population (1999) to 396.87 per 100000 of population (2013). Long-term dynamics of flue morbidity in Zhytomyr region districts have common patterns, sometimes being characterized by individual peculiarities. Indicators of influenza morbidity coincide with the course of disease in the region and Ukraine in whole. We have also found that territorial distribution of influenza-induced morbidity in districts depends on the number of people inhabiting data districts with the most intense performance in the major cities and regions, and the lowest in small ecological areas by population of Zhytomyr region. It has been investigated that in small districts by population in some years the incidence of influenza was zero. This is due to the problems of diagnostics or registered cases of influenza in medical institutions. The peculiarity of our observations is also finding out high rates of influenza among the population of Narodychi district Zhytomyr region in 2000 and 2003.

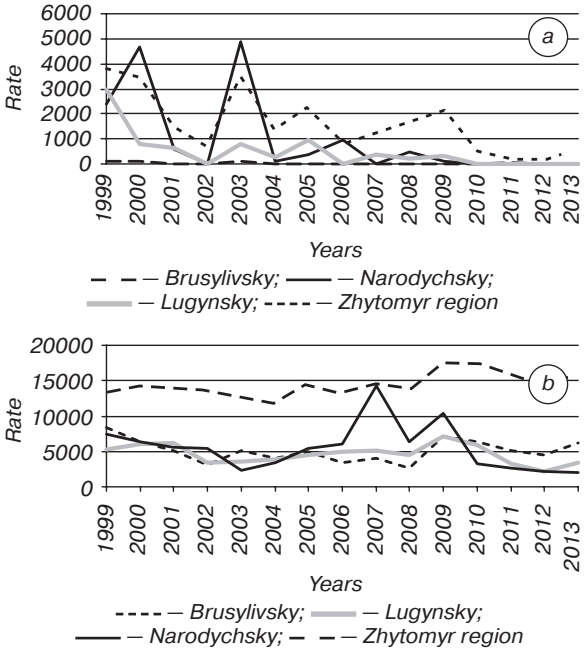

Fig. 3. Dynamics of influenza morbidity (*a*) and ARVI morbidity (*b*) in population of small districts by population in Zhytomyr region and the region in whole during 1999–2013 (rate of morbidity per 100000 of population)

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