SciForschen
Open HUB for Scientific Research

ISSN 2471-8122

Journal of Pharmaceutical Analytics and Insights

Research Article | Volume: 1.3 | Open Access

Lithuanian Paradox in Epidemiology of Acute Respiratory Infections and Influenza: Is it the Realm for Cultural and Spiritual Interpretation?

SV Kondrichin[1] and YE Razvodovsky[2*]

[1]*Minsk regional clinical hospital*
[2]*Grodno State Medical University, Grodno, Belarus*

***Corresponding author:** YE Razvodovsky, Grodno State Medical University, 80 Gorky Street, Grodno 230009, Belarus, Tel: +3750152701884; Fax: +3750152435341; **E-mail:** yury_razvodovsky@mail.ru

Received date: 04 Feb 2016; **Accepted date:** 06 Apr 2016; **Published date:** 11 Apr 2016.

Citation: Kondrichin SV, Razvodovsky YE (2016) Lithuanian Paradox in Epidemiology of Acute Respiratory Infections and Influenza: Is it the Realm for Cultural and Spiritual Interpretation? J Pharm Anal Insights 1(3): doi http://dx.doi.org/10.16966/2471-8122.110

Abstract

Background: The regional difference in acute respiratory infection (ARI) and influenza morbidity rates is one of the actual epidemiological problems in USSR. The aim of the current study was to evaluate the official statistics data on epidemiological activity of acute respiratory illness in the republics of the former USSR.

Materials and Methods: The study is based on official statistical data on epidemiological activity of ARI and influenza in the study region accumulated in the Central Statistical Committee of the USSR (*CSU SSSR*).

Results: The lowest epidemiological activity was regularly registered in Lithuania. The stability of epidemiological pattern makes possible to define the problem as "Lithuanian paradox". The comparison of Lithuanian data with the pattern of ARI geographical distribution in Belarus has revealed a spatial continuation: the Hrodna region of Belarus, bordering with Lithuania, has the lowest ARI illness rate in the country. The possible reasons of this phenomenon have been discussed. Two competitive models were proposed: the heath effect of the religion (Catholic faith) and historical interpretation of the regional immune status specificity based models.

Conclusions: The findings inspired the interest to investigation on relationship between man and viruses. Further studies are necessary to define the protective role of social and cultural factors in the epidemiology of ARI and influenza.

Keywords: Epidemiological activity of acute respiratory infection; Influenza mortality rate; Tuberculosis incidence rate; Lithuania; Comparative analysis; Cultural factors

Introduction

The cross-sectional and longitudinal analysis of acute respiratory infection (ARI) and influenza epidemiological activity are of interest, but difficult for practical implementation area of scientific research. The lack of reliable and comparable statistical data is the main obstacles for accomplishing of cross-national comparison [1-3]. It is well known opinion that indicators of ARI and influenza, which are registered in different countries are not comparable between themselves insofar as numbers of ill people who turn for the medical help in a large degree depends from the state of the national medical service, the system of social protection and insurance, also as from the other conditions [4]. For these reasons the statistical material on prevalence of ARI and influenza accumulated in the borders of the USSR and in the post-soviet space has acquired a particular significance.

The USSR had a highly standardized system of infection disease surveillance and epidemiological control; it covers large territories, differing in climatic and cultural characteristics [4-7]. The soviet governmental model has provided the appearance of the serial and statistically reliable data of ARI and influenza across the different administrative territorial units, also across the national republics of the former USSR.

Nevertheless, the work of many years has not been appropriately analyzed. The epidemiological studies in the USSR were carried out on the data provided from the supporting bases of all Union centers of influenza and ARI, which were placed in large citers, but data in the national republics have not been compared properly (due to data secrecy in the Soviet period).

In epidemiological studies, related to the Soviet period, it was shown that different factors are responsible for the regional distribution of ARI and influenza, but the role of urbanization, or intensity of interpersonal contacts, have been considered as a dominant factor. It was suggested, that factor of urbanization, in the sum with climatic factor, can explain more than 2/3 of all ARI and influenza spatial variances. At the same time, the accurate conclusion has been made about the significance of historical mechanisms in the regional immune status formation (discussed below).

In parallel with the studies on ARI regional differences, in USSR has been noted the general tendency towards an increase in ARI and influenza annual morbidity rate [6]. In spite the fact, that factor of urbanity can also be interconnected with the long-term changes in ARI morbidity rate, the interpretation of this phenomenon remains highly disputable [7].

After the fall of the USSR the quality of epidemiological surveillance on ARI and influenza in some newly appeared independent states grows worse (e.g. in the Ukraine and in some regions of Russian Federation), thus, in such cases, official statistics becomes inappropriate for cross-national comparison [8]. In Belarus the previous model of epidemiological surveillance has preserved its significance, and ARI statistics in the country is estimated as a more reliable.

This work aims to compare long term trends of ARI and influenza epidemiological activity in the 6 former Soviet Republics, with a special attention of two neighboring - Lithuania and Belarus. The period 1959-1989 has been chosen for analysis of all six republics and period 1959-2012 for comparison of Lithuanian and Belarusian epidemiological trends.

Material and Methods

Data: The work is based on official statistical data on ARI and influenza annual morbidity (incidence) rates (the annual number of cases per 1,00,000 population) in the former Soviet Republics during the period 1959-1989, accumulated by the Central Statistical Committee of the USSR (*CSU SSSR*). Data were composed on the Ministry of Health annual reports about the epidemiological activity of inflection diseases in the republics.

The annual data of ARI and influenza after 1990 was received from official statistically yearbooks of Statistical Departments of Lithuania and National Statistical Committee of Republic of Belarus.

Methods

The ARI and influenza morbidity and influenza mortality rates in the data were validated by studying rank order distribution and long-term trends in the respective countries. Rate per 100,000 are used in the figures. More accurate and complete cross-national comparisons are, however, impossible because of inability of detailed statistics. Therefore long-term comparison represents a more fruitful approach: it shows how ARI morbidity and influenza mortality rates have varied in the former Soviet republics under comparable circumstances. The average annual ARI and influenza morbidity rates for the period 1959-1972 have been calculated. The comparison of ARI and influenza morbidity ranking with tuberculosis incidence rate ranking between 6 Soviet republics has been made.

The Paired-Samplest-test and correlation analysis were used for comparison of annual data in Lithuania and Belarus for period 1959-2012.

Results

The basic social and demographic indicators for the former Slavic and Baltic Soviet republics are presented in the Table 1. The consecutive analysis of epidemiological distribution of ARI and influenza annual epidemiological activity must be accomplished within frames of this social statistics set.

Table 2 presents the average of ARI and influenza morbidity rates in 6 republics and distribution of range positions by the decrease for the period 1959-1972 (first column) and rates in consecutive years, till 1989. It is seen that during the all study period the Lithuania has the lowest rank in cross-national comparison of ARI and influenza epidemiological activity. At the same time, on the opposite pole there are noticeable variations in rank positions. During the period 1959-1972 the Russian Federation had the highest rank position, with the average rate 2,5-fold higher than Lithuanian. But in years 1975, 1980 and 1985, neighboring with the Lithuania, Latvia was the leader in the ranking list.

Belarus had the nearest position to Lithuania, but the average rate of ARI and influenza in Belarus was 1.8 times higher than the Lithuanian, while for all other republics it was more than 2 time difference.

Comparing the rank order of ARI and influenza rate distribution with the social and demographic data by the republics (Table 1) it is possible to conclude that the process of urbanization should not be considered as the main factor responsible higher rates. It should be stressed that it is the most accepted theory used for explanation of ARI and influenza regional variations [4-7]. But in that case the potential of this theoretical justification is obviously limited. The share of rural population in Belarus was higher than in Lithuania: in 1959-1976 the difference was 6-8% and in 1989-3%. We can come to the same conclusions when comparing the indices of urbanization between Lithuania and Ukraine, as Lithuania and Latvia, in particular, to the end of Soviet period.

It is well known that ARI morbidity in children is higher than in adults: near 50% of all cases of ARI has occurred in population under the 16 years of age. But the proportion of children in population should not be considered as the leading causative factor of considering the differences in case distribution: Latvia with one of the highest ARI morbidity rates has the lowest proportion of children. It must be stressed that in 1989 the proportion of children (0-14 years) in Lithuania and Belarus was practically the same.

The additional argument supporting the dominant role of urbanization in the shaping of the AIR morbidity rates difference between republics presents the comparison of data for the urban and rural population (Table 3). For Lithuania the rank order was the lowest in both cases.

It is typical, that the regional difference in ARI morbidity rates generally correlates with the differences in influenza mortality rate (Table 4). The rank order of influenza mortality rates was the lowest in Lithuania and Belarus placed on the nearest rank position.

Noteworthy, that the similar order in mortality distribution with two-fold difference between the neighboring countries were noted in 2009 pandemic influenza: Lithuania has 23 lethal cases and rate (per 1,00,000) was 0,6; Latvia 35 (1,6); Estonia 19 (1,4) and Pskov region of Russian Federation 17 (2,5) (5).

The theoretical potential of sociocultural and historical model in explanation of geographical pattern of ARI and influenza morbidity rates seems greatly limited. This model is more appropriate when it is used for the classical indicator of social fabric weakness - the tuberculosis incidence rate. Since 1975 the Baltic republics have the lowest tuberculosis incidence

	% of rural populations by years			% of children in the age 0-9 in 1959	Population density (1959) people per 1 sq km	Education: the % of persons with higher (and secondary) education population in 1959	% of population of title nationality in 1959
	1959	1976	1989				
Russian Federation	48	32	26	21.9	6.9	1.9 (263)	83.3
Ukraine	54	40	33	18.8	69.7	1.7 (286)	76.8
Belarus	69	48	35	21.9	38.8	1.2 (225)	81.1
Lithuania	61	43	32	18.7	41.6	1.3 (175)	79.3
Latvia	44	34	29	15.1	32.9	2.1 (344)	62.0
Estonia	44	32	28	15.8	26.5	2.1 (304)	74.6

Source: *CSUSSSR* (data for1959) *Itogi vsesouznoj perepisi naselenija* 1959 *goda. Moskva: CSU,* 1962.
Table 1: Social and demographic characteristics by the national republics

	ARI and Influenza annual rate and average rate for 1959-1972	1975	1980	1985	1989
Russian Federation	20244(I)	24850 (II)	27009 (II)	30328(II)	28619 (I)
Ukraine	15306 (IV)	22821 (IV)	24739 (III)	30165 (III)	24550 (III)
Belarus	14999 (V)	21602 (V)	23534 (V)	24434 (IV)	26501 (II)
Lithuania	8331 (VI)	12833 (VI)	11856 (VI)	14441(VI)	12403 (VI)
Latvia	18987(II)	28949 (I)	32075 (I)	32936(I)	15725 (V)
Estonia	16793(III)	23556 (III)	23192 (IV)	24300 (V)	20220 (IV)

Source: *CSU SSSR,* annual reports
Table 2: The annual number of ARI and Influenza morbidity average rate (per100.000) column 2-5, during the period 1959-1972 (first column), and highest to lowest rank position of each region

	ARI and Influenza average annual rate during the 1966-1968		Influenza average annual rate during the1966-1968	
	Urban population	Rural population	Urban population	Rural population
Russian Federation	24811,3 (II)	6837,7 (I)	8864,3 (II)	2980,0 (II)
Ukraine	20653,3 (IV)	4485,0 (IV)	5055,7 (V)	1249,7 (V)
Belarus	25565,7 (I)	3873,3 (V)	6628,0 (IV)	1348,0 (IV)
Lithuania	12632,7(VI)	2220,7 (VI)	3606,7 (VI)	841,3 (VI)
Latvia	22013,0 (III)	5252,0 (III)	8331,3 (III)	2541,3 (III)
Estonia	18997,7 (V)	5723,7 (II)	10451,3 (I)	3064,7 (I)

Source: *CSU SSSR,* annual reports
Table 3: The average annual morbidity rates of ARI and Influenza **(**number of cases per100.000) for urban and rural populations for 1966-1968 (rate per 100.000) and rank order highest to lowest.

	Population in total	Urban population	Rural population	Population in total m. f.		Urban population m. f.		Rural population m. f.	
	average death rate for **1973-1979**			**1989** г.					
Russian Federation	2,58 (III)	2,03	3,83	0,4	0,3	0,2	0,2	0,8	0,6
Ukraine	2,4 (IV)	2,38	2,3	0,2	0,2	0,2	0,1	0,3	0,2
Belarus	2,05 (V)	1,63	2,45	0,3	0,1	0,3	0,1	0,1	0,1
Lithuania	**1,35 (VI)**	**0,98 (VI)**	**1,83 (VI)**	**0**	**0**	**0**	**0**	**0**	**0**
Latvia	3,75(I)	3,33	4,53	0,2	0	0	0	0,5	0
Estonia	3,28 (II)	2,83	4,2	0,1	0,1	0	0	0,5	0,4

Sources: *Zdravoochranenie i socialnoje obespeczenie w SSSR. M.: CSU SSSR,* issues 1975 and 1981
Demograficzeskij ezegodnik SSSR.Goskomstat SSSR. M. Finansyistatistika, 1990.
Table 4: Influenza mortality rate (per 100.000) and rank position by decreased in 6 Soviet republics: average death rate for 1973-1979 (urban/rural) and death rate in 1989 (urban/rural and male/female).

rate in the region, thus incidence rates in Lithuania was regularly higher than in Estonia and Latvia (Table 5). Noteworthy, the decrease rates in tuberculosis mortality in period 1970-1989 was more significant in Belarus and Baltic republics compared to the Russian Federation and Ukraine.

Comparison of the Tables 2 and 5 have indicated that logic of theoretical interpretation what potentially can be used for tuberculosis rate regional pattern is not opting for the case of ARI and influenza rates. It means that each of these cases has unique geographical patterns and specific regulating mechanisms. Also it is possible to suggest that some of these mechanisms stay out of the range of scientific method.

As the next step, the comparative analysis of ARI and influenza epidemiological characteristics in Lithuania and Belarus will be undertaken. The proximity of ranking positions in ARI epidemiological activity and influenza mortality rates between Lithuania and Belarus is one of reasons which justify such method.

On the base of official statistics (1959-2012) the linier dynamic trend in epidemiological activity of ARI and influenza is observed in both countries (Figure 1).

For the period 1959-2012 in Lithuania the AIR and influenza rates has 2,4 times increased, with the average annual increase 2,16%, thus in Belarus the rate has 2 time increase with the average annual increase 2,49%.

For the description of the trend liner regression model may be used. In the cases of Lithuania equation is the next: Yi =7022,6+321,6 Xi , where the beginning of coordinates is the 1959 year, and X is variable pace equal to one year. Correspond for the cases of Belarus model of liner regression is Yi =13210,1+601,9 Xi .

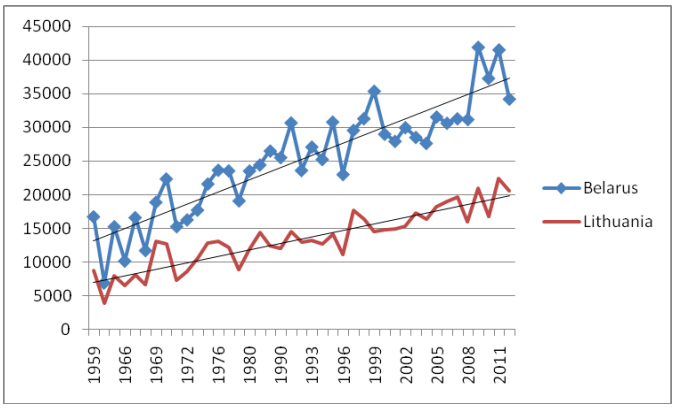
R square coefficient in Lithuanian model is 80, and in the case of Belarus it is 82, that mean that linear trend is accessible for description of ARI and influenza epidemiological activity changes in both countries.

For the all period the regular difference in rate of acute respiratory illness between the Lithuania and Belarus has preserved. Annually the rate in Belarus was higher. The average rate for the period for Belarus was 25249, 6 (SD ± 7982,8) and for Lithuania it was 13455,3 (SD ± 4299,5). Annually, the rate in Belarus in average was higher on 91, 7%. The Paired-Samplest-test used for comparison of annual data reveals the noticeable significance ($p<0.0001$).

	1970	1975	1979	1980	1985	1989	Δ% 1989-1970
Russian Federation	72,4 (V)	58,5 (II)	47,6 (II)	47,3 (II)	45,1 (II)	37,6 (I)	- 48,1
Ukraine	76,7 (IV)	57,9 (III)	47,1(III)	45,8 (III)	41,3 (III)	34,5(II)	- 55,1
Belarus	98,8(I)	70,7 (I)	60,8 (I)	56,7 (I)	44,8 (I)	31,0 (IV)	- 68,2
Lithuania	90,6(II)	56,8 (IV)	40,1 (IV)	38,5 (IV)	33,9 (IV)	32,5 (III)	- 64,1
Latvia	80,6 (III)	51,6 (V)	37,6 (V)	38,4 (V)	30,8 (V)	26,8 (V)	- 66.7
Estonia	65,6 (VI)	44,3 (VI)	32,0 (VI)	33,8 (VI)	30,2 (VI)	23,1 (VI)	- 64,8

Sources: *Zabolewajemosc naselenia SSSR tuberculiozom I smertnoscotnego.M.:MZSSSR, CNII tuberkulioza,* 1981.*Ochrana zdorovija v SSSR. M.: Finansy I statistika,* 1990.

Table 5: The changes of the tuberculosis incidence rate (per 100.000) in 6 Soviet republics and rank position by the decreased, 1970-1989



Sources: *CSU SSSR*, annual reports (for 1959-1989); Statistical yearbooks of Statistical Departments of Lithuania and National Statistical Committee of Republic of Belarus, annual editions (for 1990-2012)

Figure 1: ARI and Influenza annual morbidity rates (per 100.000) in Lithuania and Belarus for period 1959-2012.

The epidemiological studies undertaken in the USSR indicated that between some regions the regular differences in ARI morbidity rates were registered, but the annual dynamic in various regions was the same (2,3). The significant correlation between annual ARI epidemiological activity in both countries confirmed this conclusion ($r=0,93$; $p<0.0001$).

Spatial variation of morbidity rates – space paradox

The analysis of ARI and influenza rate distribution between the regions of Belarus has indicated that Hrodna regions, bordering Lithuania, has the lowest rate in the country, and there is a noticeable west-east gradient in AIR morbidity rates on the territory of Vitebsk region: the western districts of this region, bordering with Lithuania, have a lower rates comparing to the eastern one [9]. For the period 1960-1972 the average rate of ARI and influenza (per 100.000) by the regions of Belarus was the next: Minsk-city 40755; Vitebsk region 14135; Mahiliou region 13297; Homel region 13212; Minsk region 9179; Brest region 9191 and Hrodna region 6496. Data on mortality rate from influenza presented by the regions of Belarus generally repeat that pattern of distribution: Hrodna region usually had the lowest mortality rate in the county.

Temporal variations of morbidity rates – time paradox

Figure 2 presents the annual dynamics of the ARI and influenza in Lithuania and Hrodna region for period 1960-2011. There are two different periods before and after year 1989.

In the Soviet period (1960-1989) the average annual rate of ARI and influenza was lower in Hrodna region, but after 1989 the polarity has changed and Hrodna region has demonstrated a noticeable increase in the morbidity. These data call into question the reliability of medical statistic of independence period and stress the values of statistical data from the Soviet period.

There is a number of evidence to conclude that "Lithuanian paradox" is not confined by the Lithuanian territory but manifest himself in the bordering regions of Belarus. The special extension of these phenomena creates an additional opportunities for its theoretical interpretation, gives a possibility to consider some common etiological reasons influencing epidemiological process in the different national states.

Discussion

During the decades the noticeable increasing trends in ARI and influenza rate were registered both in Lithuania and Belarus. The liner regression model can describe this trend. The in general was unchangeable in the different historical periods: in period of USSR and in period of independency after 1990. The data repeat the ARI and influenza rate increasing tendency that was previously noted in the different regions of the USSR [6].

It is necessary to stress that after 1990 the accuracy of ARI and influenza incidence rates in the some countries included in the USSR became significantly worse (e.g. in the Ukraine) [7].

In spite the fact that the tendency to increase of ARI and influenza rate was known previously, there are not any reliable explanations for this phenomenon. Previously proposed model of "urbanization" has obvious limitations and should not be considered as a dominant [7].

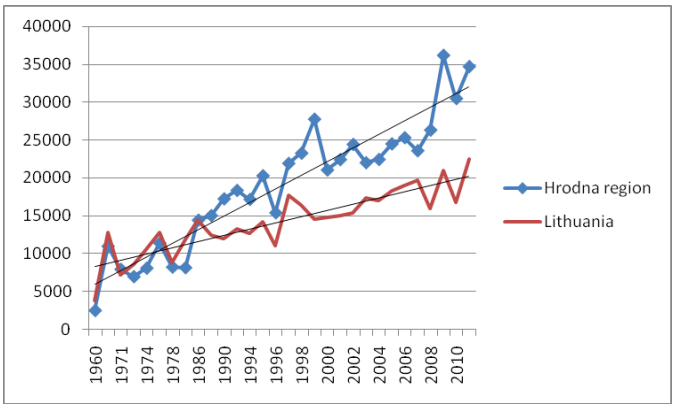
The similarity in the tendency of ARI epidemiological activity dynamic revealed in the neighboring countries, which differ in social and economic aspects, confirms the reliability of the national statistical data.

Thus the data have actualized two epidemiological paradoxes simultaneously: one is the "time paradox", which indicates the AIR incidence increased which occurs in spite of sophistication in the sphere of prevention, the other one is the "paradox of space", indicating the regular regional differences in prevalence between the neighboring countries.

In what manner these paradoxes are corresponded to each other? What is the most appropriate methodological and theoretical direction to find the problem solution? In what way the work results can be applicable to the practical sphere? These and some other questions stay without the answer but they indicate the significance and necessity of further research.

The main question of the study stays without answer yet. What are the possible reasons responsible for ARI and influenza incidence rates spatial differentiation between Lithuania and neighboring countries?

There are several characteristics indicating that considering phenomenon is not a result of miscalculation: the stable pattern of AIR morbidity geographical distribution registered in the USSR and in the period after 1991, the similarity of distribution for urban and rural population, the duplication of this regional pattern by the influenza



Sources: *CSU SSSR* (for 1959-1989); Statistical yearbooks of Statistical Departments of Lithuania and National Statistical Committee of Republic of Belarus, annual editions (for 1990-2012)

Figure 2: ARI and Influenza morbidity rates in Lithuania and Hrodna region of Belarus for period 1960-2011.

mortality rate indices, the spatial continuation of the phenomena (presented by the low ARI epidemiological activity in the bordering regions of Belarus).

In the course of discussion the limitations of demographic and structural explanation have been considered.

Taking in consideration the difference with a spatial mode of tuberculosis incidence rate distribution between Slavic and Baltic republics it seems reasonable to suggest that social, economic and cultural reasons which are potentially responsible for regional variations in the cases of both diseases are different.

Also it is difficult to propose some environmental or ecological reasons responsible for particular ARI regional pattern, manifesting exclusively on the territory of Lithuania and Hrodna region. At the same time, there is all evidence to think that the reasons of ARI regional differentiation have been grounded in human population, not in particularities of inflectional agent. It is possible to consider the functioning of some mechanisms of resistance, which are responsible for specific epidemiological pattern. While the continuation of research is promising which will be realizing both in anthropological and in socio-cultural dimensions.

Beginning from the classical works in the realm of sociology and demography in XVIII-XIX centuries (Sussmilch, Masaryk, Morselli, Durkheim) religion is considered as a factor associated with the regional health status. The most known became the conclusions of Durkheim about the suicide rate differences in catholic and protestant communities [10]. In spite of the number of controversies many scientists considering the religion as one of the potent factor in suicide prevention.

In the frame of present work is important that religion (spiritual life) should be considered in the group of factors responsible for the population health. The question is: How to project its influence in the realm of ARI epidemiology? There are several methodological limitations which seriously complicate further discussion: e.g., ARI epidemiological activity is lower in more religious rural population, thus more precise analysis is needed for differentiation. There are some contradictions with the influence of religiosity in the USSR, when religion officially was referred to the marginal social phenomenon.

However, it is impossible to ignore the fact that Lithuania was a single "catholic republic" in the USSR, and Hrodna region is the most "catholic region" in Belarus. Such a correspondence in confessional geography with geographical pattern of ARI epidemiological activity may be considered as accidental phenomena, but accumulated data on multidirectional relationship between religion and health are not afford to do this automatically, and this relationship should be considerate as one of the potential hypothesis at least.

The relationship between regional ARI epidemiological activity and adherence of population to the Catholic faith should be considered in the several aspects simultaneously.

Firstly, it may be proposed the protective effect of some psychological and emotional factors operating on the population level which have increased the resistance to infection. The adherence to the Catholic doctrine is able to provide a special emotional balance: "The peace of the Lord be with you". The growing number of evidence in support of psychological and psychosocial effects in ARI genesis has justified further considerations in this area [11-14].

In contrast to psychological and idealistic interpretation the discussed relationship may have more materialistic theoretical background. The sociological studies showed that Catholics demonstrate more strict church discipline than Orthodox, the representatives of the main confession in Belarus: they are more regularly gone to church and participate in the mass [15-16]. From the epidemiological standpoint the frequency of interpersonal contacts in the catholic group will be higher, what can influence the processes of immunity status changes also as in epidemic as in non-epidemic period. Noteworthy, that church attendance is accompanied by kissing of the cross, sprinkling of the Holly water, receiving bred. All these acts facilitate the contamination. The study of holly water spring in the Catholic churches has revealed the high level of microbial contamination [17]. What can suggest that regular church visiting and active participation in the Eucharist can lead to mobilization of individual immune system and promote the appearance of specific protective factors in population immunity, which increased resistance to infection in epidemic period. Thus the words of the Christ - "What goes into the mouth does not make anyone unclean…" in addition to their spiritual significance may also have a specific physiological explanation.

In spite of some attractive moments the theoretical background of this hypothesis really stays fragile, but its practical significance for the health of individual and population can overweight obvious theoretical limitations. Some of limitations in the context of present discussion have a particular interest; at beginning of XXI century Lithuania has lead the World ranking list of suicide rates. In that case "ecological fallacy" can be considered as a suitable auxiliary interpretation.

As a competitive, should be considered a hypothesis grounded on particular physiology of immune system in both population groups. It is worth to stress that the process of viral invasion in population doesn't have strict time frames, insofar as the actual epidemiological characteristics have been specified by "historically composed immune status of population" [18]. What means that Lithuanian paradox solution may be found in the realm of ethnic history and in investigation of evolutionary processes in regional immune status?

The population of Lithuania and population of the northern regions of Belarus have similar genetic, morphological and physiological characteristics [19,20]. That similarity is a result of long-term interethnic contacts and interplays between Old Slavic and Baltic tribes which populated this region in Early Middle Ages. Several studies discussed the possible role of ethnic and genetic component in formation of north-south gradient in spatial differentiation of the health status and mortality in Belarus [21].

The significance of immunogenetic mechanisms in interplay between viruses and the host widely discussed at present, the same mechanisms have potential to determinate the level of epidemiological activity of ARI

and influenza [22-24]. Consequently, it is logically to propose the existence of common protective immunogenetic factors responsible for resistance to ARI in population of Lithuania and Hrodna region in epidemic period.

However this hypothesis looks weaker even than previous. It has the range of objections: at first, the high incidence of ARI in Vitebsk region of Belarus and in Latvia, or in those population groups which historically and genetically are closely connected with Lithuanian.

Conclusion

It seems obvious that multi-factorial genesis of ARI epidemiological activity indicators creates a major obstacle for problem solution, but it is not reason to refuse from the further attempts. It seems that material discussed generates more questions in the realm of ARI epidemiology than give any practical solutions. However one of the results is indication on the limits in implementation of one-sided approaches and on the fragility of theoretical constructs seems unflinching before.

The difficulties in the theoretical interpretation only stress the significance of Lithuanian phenomenon for epidemiology of ARI and influenza morbidity rates. Without the correct explanation of unique epidemiological facts we postpone the perspective of the major epidemiological problems solution. The further research must be grounded on the different theoretical and methodological positions and must provide exposure to multidirectional opportunities. One of the directions is the detailed analysis of Lithuanian statistical data, but access for this data was generally limited. The other direction is the study of epidemiological characteristics on the territories bordering with Lithuania.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this article.

References

1. Dijkstra F, Donker GA, Wilbrink B, Van Gageldonk-Lafeber AB, Van Der Sande MA (2009) Long time trends in influenza-like illness and associated determinants in The Netherlands. Epidemiol Infect 137: 473-479.
2. Armstrong GL, Conn LA, Pinner RW (1999) Trends in Infectious Disease Mortality in the United States During the 20th Century. JAMA 281: 61-66.
3. Pybus OG, Rambaut A (2009) Evolutionary analysis of the dynamics of viral infectious disease. Nat Rev Genet 10: 540-550.
4. Szadrin AS, Marinich IG, Ivannikov YG, Cicenko GV (1971) Vlijanie nekotorych socialnychiklimato-geograficheskih factorov na epidemicheskij process pri grippe I ostryh respiratornyh zabolevanijah. Epidemiologija, immunologija I profilaktika respiratornych virusnych zabolevanij. Leningrad, MZSSSR,Vsesojuznyj NII grippa 5-11.
5. Marinich IG, Lukjanov YV, Nool LA (1977) Vlijanie nekotorych socialnyh faktorov na uroven zabolevajemosci grippom I ostrymi respiratornymi infekcyjami v gorodah SSSR. In Problemy grippa I ostrych respiratornych zabolevanij 20: 17-22.
6. Ivannikov YG, Ismagulov AT (1983) Epidemiologijagrippa. Alma-Ata.
7. Kondrichin SV (2014) O niekotorych metodologichiskih aspektah statisticheskogo analiza zabolevajemosci ostrymi respiratornymi infekcyjami i grippom v Belarusi. Medicinskaja statistika I orgmetodrabota v uczrezdenijah zdravoohranienija 10-15.
8. Kandrychyn S (2014) Rezistentnas cpapuljacyi jak psichasacyjalny fenomen? Pryklad dyfferencyjacyi uzrouniu zachvorvajemasci na respiratornyja infekcyji u Belarusi. Medicinskije novosci 36-48.
9. Durkheim E Suicide: a study in sociology. New York: Free Press, (1897/1951).
10. Cohen S, Alper CM, Doyle WJ, Treanor JJ, Turner RB (2006) Positive emotional style predicts resistance to illness after experimental exposure to rhinovirus or influenza a virus. Psychosom Med 68: 809-815.
11. Cohen S, Doyle WJ, Skoner DP, Rabin BS, Gwaltney JM Jr (1997) Social ties and susceptibility to the common cold. JAMA 277: 1940-1944.
12. Falagas ME, Karamanidou C, Kastoris AC, Karlis G, Rafailidis PI (2010) Psychosocial factors and susceptibility to or outcome of acute respiratory tract infections. Int J Tuberc Lung Dis 14: 141-148.
13. Turner Cobb JM, Steptoe A (1998) Psychosocial influences on upper respiratory infections illness in children. J Psychosom Res 45: 319-330.
14. Avsievich MT, Zemliakov LE, Savostionok PN (1999) Religija v usloviah socyalnych peremien v Belarusi. Minsk: Akademija postdiplomnogo obrazovanija.
15. Bezniuk DK (2006) Sostojanije I specyfika sovremennoj religioznojsituacyi v Belarusi. SocIssled 128-135.
16. Kirschner AK, Atteneder M, Schmidhuber A, Knetsch S, Farnleitner AH, et.al. (2012) Holy springs and holy water: underestimated sources of illness?. J Water Health 10: 349-357.
17. Marinich IG (1980) Kolichestvennyje zakonomiernosci epidemiologii grippa i ostrych respiratornych zabolevanij. Avtoref dis doc med nauk Moskva.
18. Salivon II, Tegako LI, Mikulich AI (1976) Ocherki po antropologii Belorussii. Minsk: Naukaitehnika.
19. Mikulich A (2005) Belarusy u genetychnaj prastory. Minsk: Tehnalogija.
20. Kandryčyn S (2008) Geografia społeczna i konturyhistorii: Podziały historyczne Białorusi w świetle danych statystyk i społecznej, medycznej i demograficznej. Warszawa, Semper.
21. Karlas A1, Machuy N, Shin Y, Pleissner KP, Artarini A, et.al. (2010) Genome-wide RNAi screen identifies human host factors crucial for influenza virus replication. Nature 463: 818-822.
22. Miyairi I, DeVincenzo JP (2008) Human Genetic Factors and respiratory syncytial virus disease severity. Clin Microbiol Rev 21: 686-703.
23. Zhang L, Katz JM, Gwinn M, Dowling NF, Khoury MJ (2009) Systems-based candidate genes for human response to influenza infection. Infect Genet Evol 9: 1148-1157.