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Evolution peculiarities of the flu in pregnant women

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Abstract

Background: Infection of the pregnant women in advanced period of pregnancy with any of the virus serotypes represents a danger not only for the developing fetus (e.g. fetal intrauterine retardation, fetal distress, oligoamniosis, etc.) but also for the pregnant woman who may develop respiratory and cardiovascular deficiency. We are interested to determine the peculiarities of the clinical evolution, of the flu diagnosis in pregnant women.

Material and methods: The general study group consisted of 189 pregnant women which was divided into 2 clinical subgroups: L1, which included pregnant women with confirmed flu ($n_1=42$) A(H1N1) and subgroup L2 of pregnant women with seasonal flu ($n_2=147$).

Results: The results of the examination of pregnant women for the flu virus's DNK confirmed high frequency of pandemic flu in 2009, $P<0.001$. Since 2010-2017 the epidemiological state is reversed, with a high frequency of seasonal flu 81.6% (110), $P<0.001$. The development of both forms (seasonal and A (H1N1)) of the flu is presented by two clinical syndromes: toxico-infectious and catarrhal, $P>0.05$. The study of laboratory investigations of women with the flu demonstrates the presence of similar changes in the both groups: iron deficiency anemia 93 (49.2%); leukopenia 84 (44.4%); leukocytosis with neutrophilia 4 (2.1%); lymphocytosis 42 (22.2%), $P>0.05$. The most frequent complications of the pregnancy in pregnant women with the flu were premature delivery (early/late periods of pregnancy) – 15 (33.3 ± 7.27) in L_1 and in L_2 – 35 (17.7 ± 3.15), $p<0.05$, followed by intrauterine fetal infestation syndrome (fetal hypoxia, intrauterine fetal development retardation, oligoamniosis, placental dysfunction) – 33 (17.4%), $p<0.05$.

Conclusions: Molecular methods of diagnosis to determine the virus serotype underlie the establishment of the definitive diagnosis of the flu. The risk of pregnancy disruption at various terms, premature birth, intrauterine fetus infestation syndrome are the most common complications in pregnant women with the flu in the study.

Key words: evolution, the flu, pregnant women.

Introduction

The flu is a severe infectious contagious disease with a benign evolution in the majority of cases with the exception in children, pregnant women, old people and adults with chronic cardiovascular diseases [1,13,15,19]. It is one of the most frequent viral respiratory infections, very often with severe evolution, being one of the causes of mortality (during epidemics and pandemics) in the general population [2,10,12,16]. Forms of the flu stated as pandemics in the previous years, with new types of viruses, avian A(H1N1), represent a combination between human and animal viruses (swine and birds) [1,2,3,24,25,26] and have been a global health problem. In pregnant women the flu has a tendency towards severe evolution (as a result of immune status suppression), with the disease-related lethality index being doubled as compared to that of the general population [9,10,11,12,23]. It is well known the teratogenicity of flu viruses on the conception product, with a 2,4-fold increase in congenital malformations in pregnant women infected during embryogenesis [17,18,21,22]. Infection of the pregnant women in advanced period of pregnancy with any of the virus serotypes represents a danger not only for the developing fetus (e.g. fetal intrauterine retardation, fetal distress, oligoamniosis, etc.) but also for the pregnant woman who may develop respiratory and cardiovascular deficiency [4.5.6.8].

Paper goal is to determine the peculiarities of the clinical evolution, of the flu diagnosis in pregnant women. Objec-

tives: 1. To find the anamnestic peculiarities (including epidemiological anamnesis), clinical in pregnant women with the flu in the study; 2. Analysis of laboratory parameters in pregnant women with different forms of the flu; 3. State the impact of the flu on maternal and fetal health.

Material and methods

The study is based on the analysis of clinical cases with the flu in pregnant women hospitalized in Municipal Maternity No 2 during 2014-2017. The general study group consisted of 189 pregnant women which was divided into 2 clinical subgroups: L1, which included pregnant women with confirmed flu ($n_1=42$) A(H1N1) and subgroup L2 of pregnant women with seasonal flu ($n_2=147$).

The following methods of study have been used to achieve the proposed goal and objectives:

– The accumulation of data from the medical documentation with the elaboration of a questionnaire about the pregnancy history (including the epidemiological anamnesis with the purpose to identify the source of infection), the onset, ambulatory treatment;

– The general clinical (including respiratory) and obstetrical examination;

– Laboratory tests (general analysis of the blood, general urine analysis, biochemical analysis of blood (determining the hepatic, renal functions, general protein, reactive C protein), blood coagulation – platelet number, prothrombin, fibrinogen;

Table 1

Clinical evidence of the flu in the study groups

No	Clinical evidence	Flu A (H1N1) N1=42		Seasonal flu N2=147		t	P
		Abs.	P1±Es1	Abs.	P2±Es2		
1	Fever	38	90.5±4.52	125	85.0±2.95	1.0188	>0.05
2	Myalgia	9	21.4±6.33	43	29.3±3.75	1.0737	>0.05
3	Arthralgia	5	11.9±4.99	16	10.9±2.57	0.1779	>0.05
4	Asthenia	40	95.2±3.29	147	100.0±0.00	1.4552	>0.05
5	Headache	35	83.3±5.76	132	89.8±2.49	1.0362	>0.05
6	Dry cough	33	78.6±6.33	99	67.3±3.87	1.5734	>0.05
7	Wet cough	9	21.4±6.33	48	32.7±3.87	1.5234	>0.05
8	Sore throat	17	40.5±7.57	56	38.1±4.01	0.2801	>0.05
9	Chest pain	3	7.1±3.96	28	19.0±3.24	2.3260	<0.05
10	Running nose	10	23.8±6.57	31	21.1±3.37	0.3657	>0.05
11	Rhinorrhoea	32	76.2±6.57	77	52.4±4.12	3.0688	<0.01
12	Dispnoea	3	7.1±3.96	9	6.1±1.97	0.2258	>0.05

– Virusological methods, nasopharyngeal lavage PCR collected in the first 24-48 hours in pregnant women with temperature $\geq 38^{\circ}\text{C}$, pulseoximetry ($\leq 95\%$), clinical symptoms of respiratory failure (tachypnoea, dyspnoea) and intoxication;

– Paraclinical methods: pulseoximetry, chest digital X-ray in pregnant women with temperature $\geq 38^{\circ}\text{C}$, pulseoximetry ($\leq 95\%$), clinical symptoms of respiratory failure (tachypnoea, dyspnoea) and intoxication; electronical fetus recording (CTG), ultrasonography with Doppler;

– Biostatistical methods of processing the primary material using the "Epiinfo 2002" and "Excel" programs from the Microsoft Office package in the personal computer.

To comparatively analyze the indicators, mathematical and statistical techniques that have been applied (proportional indicators, average values, etc.). The veracity of the study was stated by calculating relative value errors ("ESp") and average ("ESm"), the "t- Student" criterion.

Clinical peculiarities of the flu evolution in pregnant women from the study (own results)

The study group consisted of 189 pregnant women, divided into 2 clinical subgroups: with confirmed flu A(H1N1) and with seasonal flu. The pregnant women with all forms of the flu were urgently hospitalized while being in different periods of pregnancy, the general condition at admission being considered satisfactory in 62 pregnant women (33%); average severity in 125 (66%), and 2 cases (1%) of severe condition that resulted in the death of pregnant women in other specialized institutions.

The study of the disease history determined the rapid onset of the flu A (H1N1) with toxic and catarrhal syndrome, which contributed to early admission (in the first 3 days of illness): 32 cases (76%), $p < 0.05$.

The epidemiological anamnesis analysis revealed the appearance of the disease after the contact with sick or in recuperation period people in 14 cases (33.3%) in L1 and

60 patients (41%) in L2. However, in most cases, the source of the infection has remained unidentified and may indicate free circulation of the virus during the epidemic, and the low level of the general population culture in the use of protective measures. Also, a link between the flu illness rate and the seasons of the year in both flu forms 177 (93.6%), $P < 0.001$ has been identified, namely in autumn-winter periods (November, December) and winter-spring (February, March).

The development of both forms of the flu is presented by two known clinical syndromes: toxico-infectious (e.g. general asthenia, fever, headache, myalgia, arthralgia) and catarrhal (dry cough occurring in the first days of the disease, followed by wet cough with expectoration in 3-4 days, sore throat), manifesting themselves identically in both groups (tab. 1).

The clinical examination of the pregnant women in the study reveals objective clinical data of a severe viral infection: increased respiratory frequency (FR) determined in 35 pregnant women (18.5%), $P < 0.01$, light/average tachycardia in 100% (189), $P > 0.05$; decrease of saturation $\text{SpO}_2 > 95\%$ in 12 pregnant women (6.3%), $P > 0.05$; changes in the auscultation of the lungs – dry breathing with dry rales (which suggests acute bronchitis), crepitation with wet breathing (diagnosed with pneumonia) in 82 pregnant women (43.3%), $P > 0.05$ (tab. 2).

The clinical examination is an important part in the diagnosing of the flu complications (bronchitis and pneumonia), determined by a similarly rate in both groups of study.

The results of the examination of pregnant women for the flu virus's DNK are presented in the table 3 which confirmed high frequency of pandemic flu in 2009 (3.3 higher than in the case of seasonal flu), $P < 0.001$. During the period of 2010-2017 the epidemiological state is reversed, with a high frequency of seasonal flu 81.6% (110), $P < 0.001$ (tab. 3).

Table 2

Clinical examination of the pregnant women included in the study

Clinical data	Flu A (H1N1) N1=42		Seasonal flu N1=147		P
	aA bs	P1±Es1	aA bs	P2±Es2	
Lung auscultation					
1 Without changes	11	26.2±6.79	86	58.5±4.06	<0.05
2 Dry ralles+harsh breathing	19	45.2±7.68	56	38.1±4.01	<0.05
3 Crepitation +wet breathing	2	4.8±3.29	5	3.4±1.49	<0.05
1 SpO ₂ a) 99-100 % b) 96-98% c) 90-94%	a) 20 b) 19 c) 3	47.6±7.71 45.2±7.68 7.1±3.96	a) 99 b) 39 c) 9	67.3±3.87 26.5±3.64 6.1±1.97	<0.05 <0.05 >0.05
2 Ps a) 80-100 b) > 100	a) 39 b) 3	92.9±3.96 7.1±3.96	a)131 b) 16	89.1±2.57 10.9±2.57	>0.05 >0.05
3 FR a) 16-20 b) 20-25	a) 39 b) 3	92.9±3.96 7.1±3.96	a) 115 b) 32	78.2±3.41 21.8±3.41	<0.01 <0.01

Table 3

PCR results of the pregnant women with the flu

Confirmation (PCR)	Flu A (H1N1)N=42		Seasonal fluN=147		t	P
	Abs.	P1±Es1	Abs.	P2±Es2		
2009	26	61.9±7.49	27	18.4±3.19	5.3396	<0.001
2010-2014	16	38.1±7.49	110	81.6±3.19	5.3396	<0.001
2015-2017	0		10	6.8±2.08	3.2749	<0.01

The study of other laboratory investigations (tab. 4) of women with the flu demonstrates the presence of similar changes in the both groups: iron deficiency anemia 93 (49.2%); leukopenia 84 (44.4%); leukocytosis with neutrophilia 4 (2.1%); lymphocytosis 42 (22.2%), $P>0.05$. Thus, the results of the above parameters determined the presence of leukopenia in the majority of pregnant women due to the immunodepressive and cytotoxic action of the virus on the body affected by the disease. According to literature, severe flu forms complicated by bacterial infection are characteri-

zed by leukocytosis with neutrophilia, increased fibrinogen and reactive C protein [23,24,25,26].

The most frequent complications of the pregnancy in pregnant women with the flu were premature delivery (early/late periods of pregnancy) – 15 (33.3±7.27) in L_1 and in L_2 – 35 (17.7±3.15), $p<0.05$, followed by intrauterine fetal infestation syndrome (fetal hypoxia, intrauterine fetal development retardation, oligoamniosis, placental dysfunction) – 33 (17.4%), $p<0.05$.

Table 4

Laboratory results in pregnant women with the flu in the study

No	Laboratory tests (obtained data)	Flu A(H1N1) N1=42		Seasonal flu N2=147		t	P
		Abs.	P1±Es1	Abs.	P2±Es2		
1AGS:	Anaemia	26	61.9±7.49	67	45.6±4.10	1.9545	>0.05
2	Lymphocytosis	8	19.0±6.05	34	23.1±3.48	0.5874	>0.05
3	Monocytosis	12	28.6±6.97	26	17.7±3.15	1.4248	>0.05
4	Leukopenia	21	50.0±7.72	63	42.9±4.08	0.8134	>0.05
5	Leucocytosis	3	7.1±3.96	1	0.7±0.69	1.5912	>0.05
1. Blood biochemistry							
2	High fibrinogen	3	7.1±3.96	1	0.7±0.69	1.5912	>0.05
3	Reactive protein C	4	9.5±4.52	0			<0.05
4	Hipoproteinemia	6	14.3±5.40	3	2.0±1.15	2.2267	<0.05

Conclusions

1. The risk of getting the flu (60%) is increased in pregnant women who had direct contact with sick people.
2. The clinical symptoms of the flu are similar when infected with different serotypes, manifested by catharal and toxico-infectious syndrome, with a moderate/severe evolution (74%) in pregnant women with the flu A(H1N1).
3. Molecular methods of diagnosis to determine the virus serotype underlie the establishment of the definitive diagnosis of the flu.
4. The risk of pregnancy disruption at various terms, premature birth, and intrauterine fetus infestation syndrome are the most common complications in pregnant women with the flu in the study.

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