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Epidemiological Aspects of Arbovirus Infections in the South-Eastern Part of Azerbaijan

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The purpose of the work was to study the epidemiological aspects of arbovirus infections in the southeastern part of Azerbaijan using serological studies and questionnaires using forms developed by us.

Materials and methods. The study involved 633 residents of the southeastern part of Azerbaijan (Lankaran, Masally districts, the territory of the Qizil-Aghaj State Reserve), who underwent a serological survey on a voluntary basis.

Results and discussion. Seropositive were 15.3 ± ± 1.4% of the examined. 6 types of arbovirus infections have been identified – West Nile Fever, Sindbis, Tahyna, Batai, Uukuniemi and Bhanja. The dominant types of arboviruses were Sindbis and Tahyna, the detection rate of which is 30.5 ± 4.5 and 26.2 ± 4.4%, respectively ($\chi 2=0.56$; $P>0.05$), detection of other types did not exceed 10.4 ± 2.9% ($\chi 2=9.21$; $P<0.01$). The level of seropositivity depended on the condition of the residents at the time of blood sampling. Comparative evaluation of the identified symptoms in seropositive residents and their interpretation allows to identify risk groups, which is advisable for reducing serological studies and identifying seropositive patients more targetedly. It has been established that the most effective infection occurs in May–June and September–October, when the activity of mosquitoes and the density of their settlement in residential premises and other biotopes in the human habitat is the highest.

Conclusion. The study of the seasonality of infection of residents with arbovirus in epidemiological terms is very important, as it allows planning and implementing appropriate preventive measures. Based on the data obtained, it can be argued that the most effective infection of residents occurs in May–June and September–October, when the activity of mosquitoes and their density in residential premises and other biotopes in the habitat of residents is the highest. Infection can also occur in summer, late autumn and early spring, but it is not very effective. Therefore, to reduce the risk of infection of residents, it is advisable to carry out anti-mosquito measures, taking into account the seasonal activity of mosquitoes.

Keywords: arbovirus infections, seroprevalence, seasonality.

Introduction. The development and course of the epidemic process in any infection depends, first of all, on the characteristics of the causative agent and favorable conditions for its circulation between donors and recipients. The above fully refers to arbovirus infections (AVI), which are pronounced socially significant zoonotic infections and their spread is largely related to social factors [1]. AVIs in their numbers make up 2/3 of all vertebrate viruses, today there are more than 500 types of AVIs, while about 120 types of AVIs cause diseases in humans, domestic animals and birds. Blood-sucking mosquitoes are the most effective carriers. Currently, AVIs are being widely studied.

In Azerbaijan, in the period of 1967-1980 complex serological and virological studies were carried out. They were dedicated to the detection and study of natural foci of arboviruses and the clarification of their role in regional pathology. As a result of these studies, a number of arbovirus foci were found in the territory of various natural regions of the Republic.

All these studies are summarized in the review article by A. Sh. Ismailov and M. S. Kasymov. A total of 4 types of AVI were found among blood-sucking mosquitoes, humans, animals and birds [2, 3, 4].

The purpose of the work was to study the epidemiological aspects of arbovirus infections in the South-Eastern part of Azerbaijan using serological studies and questionnaires using forms developed by us.

Materials and methods. On a voluntary basis, we conducted a serological examination of 633 residents of the South-Eastern part of Azerbaijan (Lankaran, Masally districts, the territory of the Qizil-Aghaj State Reserve), and 353 of them had a temperature at the time of the examination or were observed shortly before the examination, the remaining 280 residents did not have a temperature during the year.

Blood sampling for serological studies after explanatory work was taken by district doctors, nurses and paramedics. It should be noted that the region under study is highly endemic for malaria, where previously large epidemics of this parasitic infection were observed. Therefore, in the villages of the region, blood samples are routinely taken for malaria, which also facilitated our work. The survey was conducted with the help of questionnaires developed by us among all the examined. Laboratory testing was

carried out on the basis of the Center for Control of Particularly Dangerous Infections in 2019–2021.

The study was carried out in compliance with the basic provisions of the "Rules of ethical principles of scientific medical research with human participation", approved by the Declaration of Helsinki (1964-2013), ICH GCP (1996), EEC Directive No. 609 (dated 24.11.1986). All the participants were informed about the goals, organization, methods of examination and signed an informed consent to participate in the completely anonymous study.

Statistical processing of the results was carried out using the MS Excel package [4].

Research results. 97 out of 633 examined residents (15.3 ± 1.4%) were seropositive. 6 types of AVI were identified – West Nile Fever, Sindbis, Tahyna, Batai, Uukuniemi and Bhanja. The dominant types of AVI are Sindbis and Tahyna, the detection of which is 30.5 ± 4.5 and 26.2 ± 4.4%, respectively ($\chi2=0.56$; $P>0.05$), the detection of other types does not exceed 10.4 ± 2.9% ($\chi2=9.21$; $P<0.01$). The level of seropositivity turned out to be dependent on the condition of the residents at the time of blood sampling (**Tables 1** and **2**). Thus, 72 out of 353 with fever or those who experienced it in the recent past turned out to be seropositive (20.4 ± 2.1%). Whereas in the absence of fever, 25 out of 280 were seropositive (8.9 ± 1.7%, $\chi2=15.83$; $P<0.01$). Thus, the presence of temperature is an important clinical symptom of AVI. With regard to the clinical picture, it can be noted that a comparative assessment of the detected symptoms in seropositive residents and their interpretation allows to identify risk groups. It is necessary to reduce serological studies and to detect the seropositive more targetedly. For this purpose, in order to compile a complete picture of the clinic and the symptoms of individual types of AVI, the available published data, given below, were summarized.

West Nile Fever (WNF). The incubation period varies from several days to 2–3 weeks. The infection begins acutely, the body temperature rises to 38–40 °C, which is accompanied by chills. Some people experience short-term phenomena such as general weakness, decreased appetite, fatigue, feeling of tension in the muscles, especially in the calves, sweating, headache before the temperature rises.

The febrile period lasts on average 5–7 days, although it can be extended up to 2 weeks. The temperature curve has a remitting character with periodic chills and increased sweating. At the height of intoxication, repeated vomiting often occurs, there is no appetite, pain in the heart area, a feeling of fading and other unpleasant sensations, including drowsiness, appear. In 20% of cases, a catarrhal symptom is observed in the form of nasal congestion, runny nose, and dry cough.

The skin is usually hyperemic. Maculopapular rash occurs in every 5th patient, in a severe course, the rash can acquire a hemorrhagic nature. On examination, in 90% of cases, pronounced hyperemia

Table 1 – Distribution of patients in three groups according to the detection of AVI

Studied type of AVI	Number of examined patients from the general group	Number of examined patients with fever	Number of examined patients without fever
West Nile Fever (WNF)	108	63	45
Sindbis	95	51	44
Tahyna	103	47	56
Batai	115	68	47
Uukuniemi	104	58	46
Bhanja	108	66	42
Total	633	353	280

Table 2 – Serological diagnosis of AVI among residents

Studied type of AVI	Groups of serologically examined residents						Reliability of difference	
	Number of seropositive patients from the general group		Number of seropositive patients among patients with fever		Number of seropositive patients among patients without fever			
	Abs.	%	Abs.	%	Abs.	%	χ^2	P
WNF	9	8.3±2.7	7	11.1±4.0	2	4.4±3.1	1.53	>0.05
Sindbis	29	30.5±4.5	20	39.2±6.9	9	20.5±6.2	3.92	<0.05
Tahyna	27	26.2±4.4	19	40.4±7.2	8	14.3±4.7	9.03	<0.01
Batai	12	10.4±2.9	9	13.2±4.1	3	6.4±3.6	1.40	>0.09
Uukuniemi	9	8.7±2.8	9	15.5±4.8	-	-	-	-
Bhanja	11	10.2±2.9	8	13.6±4.3	3	7.1±4.0	0.83	>0.05
Total	97	15.3±1.4	72	20.4±2.1	25	8.9±1.7	15.83	<0.01

of the conjunctiva of the eye and hyperemia of both the soft and hard palate are revealed. In very many cases, the infection proceeds with mild symptoms [5].

Tahyna. The disease in all cases begins with an increase in body temperature to 38–40 °C. Malaise, weakness, headache of varying intensity are often observed. The temperature is usually kept at febrile and paretic numbers. The infection is very often accompanied by hyperemia of the mucous membrane of the pharynx, nasal congestion and dry cough, scleritis, lymphadenopathy, conjunctivitis, hepatomegaly, arthromyalgia, and is characterized by a flu-like course. It is accompanied by headache and nausea, vomiting and dizziness. Meningeal symptoms are often observed.

Batai. Batai virus causes severe fever with thrombocytopenic syndrome. Body temperature rises to paretic and hyperpyretic numbers. Fever is accompanied by severe symptoms of intoxication, of which the first place can be attributed to headache and sleep disturbances.

Clinical observations have shown that in most patients, already on the 3rd–4th day of the disease, a hemorrhagic syndrome appears, an abundant petechial rash with localization on the upper and lower extremities, on the lateral surfaces of the body is registered. With a severe course, bruises and hemorrhages at the injection sites, mild bleeding were noted. As with Tahyna fever, in patients the disease often occurs with damage to the gastrointestinal tract. Nausea, vomiting, pain syndrome are characteristic. In the general blood analysis, thrombocytopenia and leukopenia are noted in patients from the first days [5].

Sindbis. The duration of the incubation period is 3–14 days. The disease has an acute onset – an increase in body temperature to febrile and paretic numbers, accompanied by symptoms of intoxication, among which headache, joint and muscle pain prevail. On examination in the observed patients, an increase in lymph nodes in two or more groups is almost always noted. On the skin of the trunk and extremities at the height of the infection, a spotted-papular, small-pointed, profuse, regressing rash appears after 3–4 days, with pigmentation. In isolated cases, dyspeptic disorders are noted with Sindbis fever. Every third patient has a meningeal or meningoencephalitic form. At the same time, hyperpyretic fever, diffuse headache, vomiting are observed. On examination, positive meningeal symptoms and changes in the cerebrospinal fluid of a serous nature are noted [5].

Based on the above, it can be noted that the clinic of these fevers caused by the Tahyna, Inko, Batai, Sindbis viruses is polymorphic and does not have pathognomonic symptoms. The severity of the course varies from mild inapparent forms to severe in the form of meningoencephalitis. Information on the symptoms of the above AVIs is borrowed from the fundamental works of Russian scientists [6-7]. There is little or no information on other types of AVIs, and as for severe AVIs, for example, Ebola, they are of a closed nature. Such AVIs are studied in specialized laboratories as biological weapons [5, 8, 9].

Detection of non-clinical symptoms of AVI among people who have a blood sample taken for serological diagnosis is very important. The fact is that in the presence of the above symptoms, doctors often take it as an acute respiratory disease and prescribe antibacterial drugs, which are ineffective in viral infections and only reduce the severity of the clinical course of infections. When influenza is suspected, well-known antiviral drugs are prescribed, which, as can be assumed, lead to a therapeutic effect in AVI as well. Therefore, in the presence of non-clinical symptoms, doctors can presume the presence of AVI and prescribe appropriate antiviral drugs to such patients, since AVI serodiagnosis is still not widely available. Taking into account what has been said, we summarized the non-clinical symptoms that we identified during the serological examination of the residents. The data are summarized in **Table 3**.

Among residents seropositive for AVI, only 21 symptoms were detected, on average 19.84 ± 1.11 symptoms per 1 resident. Symptoms were recorded during the collection of anamnesis by medical workers directly at the site of blood sampling from a finger. Given the small number of seropositive residents, we extrapolated the data to all 633 surveyed residents for clarity. The most notable in the diagnostic screening is the “often” column of the table. The symptoms presented in this column can be divided into 3 groups by the specific weight. The specific weight of detectability of 8 symptoms is the highest: temperature 38–40 °C, fever for 5–7 days, chills, fatigue, muscle pain, headache, sleep disorders, conjunctivitis hyperemia (1st group). The frequency of their detection varies from 68.6 ± 1.8 to 80.4 ± 1.6% ($t=4.90$; $P<0.001$). The manifestation of these symptoms is quite bright and residents fixed them easily. The duration of fixation of symptoms by residents ranged from 2 to 13 days, but, despite this, none of them sought medical help.

The 2nd group of symptoms ($t=4.81$; $P<0.001$), which are presented in the “moderate” column, has a significantly lower specific weight. Among them, 7 symptoms are distinguished, the detectability of which is of a moderate nature – decreased appetite, weakness, dizziness, vomiting, nausea, dry cough, skin hyperemia. The frequency of their detectability varies from 44.4 ± 2.0 to 55.6 ± 2.0% ($t=3.96$; $P<0.001$). Fixation of these symptoms by residents is somewhat difficult, so it was necessary to conduct additional inquiries. This group of symptoms can be used additionally to further refine the initial diagnostic screening of AVI.

Table 3 – List and frequency of non-clinical symptoms of AVI detected during serological examination among seropositive residents, extrapolated to all residents (n=633)

List of non-clinical symptoms	Frequency of non-clinical symptoms (n=633)							
	Often		Moderately		Rarely		Total	
	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Temperature of 38–40 °C	467	73.8±1.7	93	14.7±1.4	54	8.5±1.1	614	95.4±0.8
Fever within 5–7 days	491	77.6±1.7	62	9.8±1.2	54	8.5±1.1	607	95.4±0.8
Chills	509	80.4±1.6	54	8.5±1.1	39	6.2±1.0	602	95.1±0.7
Decreased appetite	352	55.6±2.0	170	26.9±1.8	62	9.8±1.2	584	92.3±1.1
Weakness	306	48.3±2.0	188	99.7±1.8	74	11.7±1.3	568	89.7±1.2
Fatigue	434	68.6±1.8	86	13.6±1.4	64	10.1±1.2	584	92.3±1.1
Sweating	103	16.3±1.5	294	46.4±2.0	194	30.6±1.8	591	93.4±1.0
Muscle pain	467	73.8±1.7	83	13.1±1.4	58	9.2±1.1	608	96.1±0.8
Headache	485	76.6±1.7	59	9.3±1.2	45	7.1±1.0	589	93.0±1.0
Dizziness	281	44.4±2.0	164	25.9±1.7	133	21.0±1.6	578	91.3±1.1
Vomiting	294	46.4±2.0	169	26.7±1.8	137	21.0±1.6	600	94.8±0.9
Nausea	345	54.5±2.0	173	27.3±1.8	84	13.3±1.4	602	95.1±0.9
Drowsiness	55	8.7±1.1	306	48.3±2.0	251	39.7±1.9	612	96.7±0.7
Sleep disorders	504	79.6±1.6	91	14.8±1.4	23	3.6±0.7	618	97.6±0.6
Runny nose	116	18.3±1.5	285	45.0±2.0	194	30.6±1.8	595	94.0±0.9
Dry cough	312	49.3±2.0	186	29.4±1.8	114	18.0±1.5	612	96.7±0.7
Skin hyperemia	297	46.9±2.0	195	30.8±1.8	106	16.7±1.5	598	94.5±0.9
Conjunctivitis	472	74.6±1.7	88	13.9±1.4	48	7.6±1.1	608	96.1±0.8
Palate hyperemia	68	10.7±1.2	311	49.1±2.0	214	33.8±1.7	593	93.7±1.0
Skin rash	73	11.5±1.3	298	47.1±2.0	222	35.1±1.9	593	93.7±1.0
Joint pain	94	14.8±1.4	293	46.3±2.0	216	34.1±1.9	603	95.3±0.8
Sum of symptoms	6525		3648		2386		12559	
Average number of symptoms per 1 resident	10.3±1.28		5.76±1.122		3.77±1.13		19.84±1.11	

Even smaller specific gravities are attributed to the symptoms of the 3rd group, presented in the "rarely" column (t=2.08; P<0.05). Despite the rarity of their detectability and the difficulty of fixation, these symptoms can be used for non-clinical screening of AVI. These include sweating, drowsiness, runny nose, palate hyperemia, skin rash, joint pain, their frequency varies from 30.6 ± 1.8 to 39.7 ± 1.9% (t=3.47; P<0.001).

Analysis of the data of the "total" column shows that from 15 (2.4 ± 0.6%) to 65 residents (10.3 ± 1.2%; t=5.90; P<0.001) did not record any symptoms. Such data have not been mentioned in the literature and were recorded by us for the first time. Such a situation is connected, most likely, with two reasons. The first of them can be explained by the fact that AVI infection can proceed in an asymptomatic form, which requires special clinical confirmation. The second reason is explained by the fact that these residents were previously infected and the corresponding specific antibodies remained in the blood, which led to a seropositive result. However, it is also not known how long antibodies persist after an AVI infection. Therefore, it is very important to conduct in-depth seroepidemiological studies.

It should also be noted that none of the 97 identified seropositive residents, despite the severity of the symptoms, did not seek medical help from doctors. There were 52 residents with the symptoms of the 1st group, 30 residents – with the symptoms of the 2nd group (χ^2=11.41; P<0.01), and 15 residents – with the symptoms of the 3rd group (χ^2=6.51; P<0.02). All seropositive residents were advised to seek medical help, 12 of them were hospitalized in an infectious disease clinic, and 85 received outpatient treatment, in which doctors included antiviral drugs in the complex therapy. According to preliminary data, outpatient treatment is successful, symptoms subside, and residents feel better.

The circulation of AVI in the conditions of the local region undoubtedly affects the health of the population. The health of residents with severe symptoms

of infection can be assessed as extremely unsatisfactory. But at the same time, asymptomatic seropositive cases were detected, which indicates a previous infection and how it affected the health of these residents remains unknown. In medicine, in recent years, a system of self-assessments by the population of their own health has been used to determine the state of health. We considered it expedient to use this system to determine the health among the residents we surveyed. The data are given in **Table 4**.

Table 4 – Self-assessment of health among serologically examined residents

Health self-assessment criteria	Serologically examined residents, n=633		Seropositive residents n=536		Seronegative residents, n=536		Significance of difference	
	Abs.	%	Abs.	%	Abs.	%	χ^2	P
Bad	42	6.6±1.0	9	9.3±3.0	33	6.2±1.0	1.48	>0.05
Rather bad	84	13.2±1.3	22	22.7±4.3	62	11.6±1.4	8.81	<0.01
Often satisfactory	161	25.4±1.7	30	30.9±4.7	131	24.4±1.9	1.49	>0.05
Satisfactory	186	29.4±1.8	28	28.9±4.6	158	29.5±2.0	0.32	>0.05
Sometimes good	90	14.3±1.4	8	8.2±2.8	82	15.3±1.6	5.62	<0.02
Good	45	7.1±1.0	-	-	45	8.4±1.2	-	-
Often excellent	25	3.9±0.8	-	-	25	4.7±0.9	-	-
Sum of points	2332		295		2037		-	
Average number of points per 1 resident	36.8±1.1		3.04±1.7		3.80±1.2		-	

The system is built on the principles of ranking, in ascending order “from worst to best”. The worst in our case is the “poor health” self-assessment. This criterion is 1 point. The best self-assessment of health is “often excellent”, the criterion is estimated at 7 points, i.e. when scoring up to 7 points, health is assessed as good. Unfortunately, the residents we observed were far from a similar sum of points. In particular, among seropositive residents, the total self-assessment of health was 3.04 ± 1.7 points, among the rest of the serologically examined residents, it was slightly higher – on average 3.80 ± 1.2 points. But unlike seropositive residents, among them 8.4 ± 1.2% considered their health to be good, 4.7 ± 0.9% – even occasionally excellent.

Somatic health of the population is unfavorable all over the world. Such diseases as cardiovascular, arterial hypertension, diabetes mellitus and some others are especially harmful to health. If the spread of AVI becomes epidemic, even more damage to the health of the population will be caused. Therefore, it is necessary to take measures for monitoring AVI and, in case of deterioration of the epidemic situation, to take appropriate restrictive measures. They are also important due to the fact that AVIs also cause damage to stock-breeding.

The epidemic process depends on the seasonality of infection transmission. This especially applies to AVIs, the transmission of which occurs exclusively through mosquitoes. In tropical countries, according to the climatic conditions (warm or hot and humid climate), the most favorable for the development and activity of mosquitoes, the transmission of such infections occurs throughout the year. In local conditions, from the second half of November to the beginning of March, the air temperature drops to 12 °C and below, at which the development of mosquitoes and their blood-sucking stops, the transmission of infections, including AVIs, becomes impossible. Therefore, seasonality is observed in the infecting of residents with AVI, which is shown in **Figure 1**.

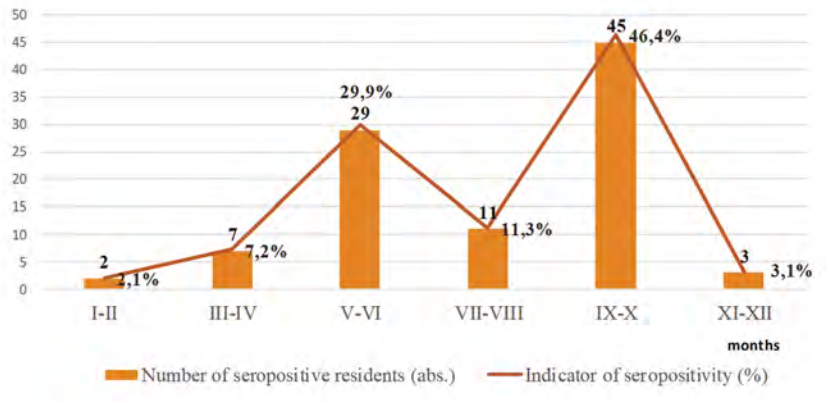

Figure 1 – Seasonality of AVI infection among residents (n=97)

As can be seen, the peak of infecting residents with AVI is September–October, amounting to 46.4 ± ± 5.1%, the second peak occurs in May–June – 29.9 ± ± 4.7% (χ^2=3.21; P>0.05). In July–August, there is a noticeable decrease in the detectability of seropositive residents – 11.3 ± 3.2% (χ^2=8.20; P<0.01).

In March–April, the frequency of detectability of seropositive residents is no more than 7.2 ± 2.6% (χ^2=0.73; P>0.05). In November–December, seropositivity decreases to 3.1 ± 1.8% (χ^2=1.16; P>0.05), and in January–February – to 2.1 ± 1.5% (χ^2=0.49; P>0.05).

The revealed seasonality of infecting of residents with AVI finds its confirmation with the data of the season of mosquito activity and their infectivity. For example, the activity of one of the most effective carrier *An.sacharovi* in May–June is 20.3 ± 1.4% of the number of the mosquitoes caught, in July–August it sharply decreases to 7.9 ± 0.9% (t=7.47; P<0.001) and in September–October it again increases to 18.6 ± 1.4% (t=6.45; P<0.001); in other months, the specific weight of mosquitoes does not exceed 7.4 ± 0.9% (t=4.34; P<0.001). The seasonal dynamics of another effective carrier of AVI *Ae.vexans* is as follows: May–June – 20.6 ± 1.4%, September–October – 19.6 ± 1.4% (t=0.51; P>0.05), July–August – 6.8 ± 0.9% (t=7.71; P<0.001), in other seasons it does not exceed 8.3 ± 0.9% (t=1.18; P>0.05). In confirmation of these data, we present the seasonal activity of the third effective carrier of AVI – *Cx.pipiens* as well. It is the most widespread species of mosquito, both in terms of range and number, and is the most resistant to higher and lower temperatures. Therefore, its seasonal curve does not have clear peaks of seasonality and it is dangerous as a carrier of AVI in all seasons of the year, except winter.

Conclusion

1. The study of the seasonality of infecting of residents with AVI in an epidemiological sense is very important, as it allows planning and implementing appropriate preventive measures.
2. Based on the data obtained, it can be stated that the most effective infecting of residents occurs in May–June and September–October, when the activity of mosquitoes and the density of their settlement in residential premises and other biotopes in the habitat of residents is the highest. Infecting can also occur in summer, late autumn and early spring, but it is ineffective.
3. Therefore, to reduce the risk of infecting the residents, it is advisable to take anti-mosquito measures taking into account the seasonal activity of mosquitoes.

Perspectives of further research. Evaluation of the effectiveness of anti-mosquito measures.

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ЕПІДЕМІОЛОГІЧНІ АСПЕКТИ АРБОВІРУСНИХ ІНФЕКЦІЙ У ПІВДЕННО-СХІДНІЙ ЧАСТИНІ АЗЕРБАЙДЖАНУ

Султанова Є. А.

Резюме. *Мета* – вивчення епідеміологічних аспектів арбовірусних інфекцій у Південно-Східній частині Азербайджану з використанням серологічних досліджень та анкетуванням за допомогою розроблених опитувальників.

Матеріал та методи. У дослідженні взяли участь 633 мешканці південно-східної частини Азербайджану (Лєнкоранський, Масалінський райони, територія Гизилагацького заповідника), яким на добровільній основі проведено серологічне обстеження.

Результати. Серопозитивними виявились 15,3±1,4% обстежених. Виявлено 6 видів арбовірусних інфекцій (ABI) - Лихоманка Західного Нілу, Сіндбіс, Тягіня, Батаї, Укуніємі та Бханджа. Домінуючими видами арбовірусних інфекцій були Синдбіс і Тягиня, виявленість яких становить відповідно 30,5±4,5 і 26,2±4,4% ($\chi2$=0,56; P>0 ,05), виявляємість інших видів не перевищує 10,4±2,9% ($\chi2$=9,21; P<0,01). Пік інфікованості обстежуваних арбовірусними інфекціями припадає на вересень-жовтень, що становить 46,4±5,1%, другий пік - на травень-червень - 29,9±4,7% ($\chi2$=3,21; P>0,05). У липні-серпні відбувається помітне зниження виявлення серопозитивних пацієнтів - 11,3±3,2% ($\chi2$=8,20; P <0,01). У березні-квітні частота виявлення серопозитивних пацієнтів становить не більше 7,2±2,6% ($\chi2$=0,73; P>0,05). У листопаді-грудні серопозитивність знижується до 3,1±1,8% ($\chi2$=1,16; P>0,05), а в січні-лютому до 2,1±1,5% ($\chi2$ = 0,49; P> 0,05).

Рівень серопозитивності залежав від стану обстежуваних у момент взяття проб крові. Порівняльна оцінка виявлених симптомів у серопозитивних обстежуваних та їх інтерпретація дозволяє виділяти групи ризику, що доцільно для скорочення серологічних досліджень та більш цілеспрямованого виявлення серопозитивних пацієнтів.

Висновок. Вивчення сезонності інфікування жителів арбовірусними інфекціями в епідеміологічному відношенні має велике значення, оскільки дозволяє планувати та здійснювати відповідні профілактичні заходи. Найбільший відсоток інфікування припадає на травень-червень і вересень-жовтень, коли активність комарів і щільність їх заселення в житлових приміщеннях та інших біотопах в середовищі мешканців найвища. Інфікування може відбуватися також влітку, пізно восени і ранньою весною, але воно малоефективне. Тому для зниження ризику інфікування мешканців доцільно проводити протикомарійні заходи з урахуванням сезонної активності комарів.

Ключові слова: арбовірусні інфекції, серопревалентність, сезонність.

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