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A RISK FOR CONGENITAL HEART DEFECTS DEVELOPMENT ASSOCIATED WITH INFECTIOUS FACTORS IN NEONATES OF THE REPUBLIC SAKHA(YAKUTIA)

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The article represents the results of retrospective investigation of pathogenic infectious factors role in possible development of congenital heart defects (CHD) in neonates of the Republic Sakha(Yakutia).

The objective is to investigate the effect of the pathogenic infectious factors on the possible development of CHD in neonates of the Republic Sakha(Yakutia).

Materials and methods: There were 1824 cases with CHD selected from the period of 2001-2003 and 2013-2015. We conducted retrospective evaluation of a number of the maternal anamnestic data, including: 1) results of immunological tests for a variety of infections (toxoplasmosis, chlamydia, herpex simplex virus and cytomegalovirus IgM and IgG); 2) various harmful factors of infectious genesis (recorded cases of acute viral respiratory infections at various terms of pregnancy, viral hepatitis, tuberculosis etc.)

Results: It has been determined that cytomegalovirus, herpes virus and acute viral respiratory infections at early pregnancy are risk factors for CHD development.

Keywords: congenital malformations, risk factors, herpes virus, viral infection, cytomegalovirus infection, Yakutia, Russia.

Introduction. Nowadays, congenital malformations significantly result in the structure of childhood morbidity, disability and neonatal mortality. It occurs in 4.0-6.0% of neonates, thus resulting in 20.0% of all childhood mortalities in the first year of life. In the structure of congenital malformations, congenital heart defects (CHDs) and congenital defects of great vessels are most common and prevalence of their rate is 8-14 cases in 1000 neonates.

The importance of risk factors analysis is in possibility of initial prevention of CHD development. Thus, significant risk factors for congenital malformations are pathological pregnancy, obstetric anamnestic record, peculiarities of the current pregnancy and birth.

Some investigators constitute that the presence of persistent intracellular infection, which results in permanent decrease of immune reaction, is one of the reasons for CHD [2, 3]. A retrospective cohort investigation of correlation between the present viral infection (influenza, rubella, measles, chicken-pox and hepatitis) for the period from 6 months before pregnancy to the moment of prenatal examination revealed statistically significant discrepancies in cohort of children with CHD and cohort of healthy children in respect of influenza virus [4]. Statistic survey showed that maternal viral infection of the first term of pregnancy increases the risk of non-chromosomal congenital malformations. At the same time, the prevalence of clinically confirmed cases of TORCH-infection among neonates with clinical manifestations, characteristic to intrauterine infection, amount to 18.9% [1]. Thus, the investigations of the role of the intrauterine infection in the development of CHD in neonates are greatly significant.

Objectives: The objective is to investigate effect of the pathogenic infectious factors on the possible development of CHD in neonates of the Republic Sakha (Yakutia).

Materials and methods: There were 1824 cases with CHD selected from the period of 2001-2003 and 2013-2015. According our data, for the period A (2001-2003) 697 cases were recorded, and for the period B (2013-2015) there were 1127 cases of CHD in neonates born alive and hospitalized in profile departments.

CHD group 1: low-probability CHD. Isolated low-probability interatrial septal defect, low-probability interatrial septal defect in association with patent ductus arteriosus (PDA) with less than 0.2 cm defect size are included in the group.

CHD group 2: probable CHD. Isolated probable interatrial septal defect, probable interatrial defect with PDA less than 0.2 cm are included here.

CHD group 3: The group includes neonates with confirmed CHD, who are diagnosed with: 1) simple CHD: a defect of interatrial septum is highly probable, a defect of interventricular septum is with / without combined PDA, 2) complex CHD with / without PDA. The diagnosis of all patients of the 3-rd group with complex CHD, are confirmed not only by ECG methods but also X-Ray examinations.

Thus, CHD group 1 composed 55.5% (n=1013), CHD group 2 constituted 10.1% (n=184), and CHD group 3 revealed 34.4% (n=627) of all the selected cases of CHD (n=1824). We assessed maternal anamnestic factors retrospectively: 1) results of immune analysis (IgM and IgG) to toxoplasmosis, chlamydia, herpes simplex virus, and cytomegalovirus; 2) different harmful factors of infectious genesis (recorded cases of respiratory viral infection at different terms of pregnancy, viral hepatitis, tuberculosis etc.)

Results and discussion. To assess the influence of infectious factors to CHD development we have analysed the re-

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sults of serologic tests. Serologic tests to *Chlamidia trachomatis, Chlamidia pneumonia, Toxoplasma gondii,* cytomegalovirus and herpes simplex (IgM, IgG) in mothers were detected.

In whole selection of CHD with serologic test to *Chlamidia trachomatis* (*Chl. Trach*), (n=643, 34%) immunoglobulin of class G (IgG) (27.1%) was most common. The analysis shows statistically significant results of IgG prevalence to *Chl. Trach* in all three groups of CHDs – 26.5%, 42.2%, 25.7% respectively (p=0.067). The second group shows the highest case detection of IgG to Chl. Trach – 42.2% (Table 1).

The analysis of serologic investigation to *Chlamidia pneumonia* in children with CHD is represented in a table 2. In whole selection of CHD (n=648, 37.8%) with serologic test to *Chlamidia pneumonia* (Chl. pneum.) immunoglobulin of class G (IgG) (26.7%) was most common. In all groups the level of IgG was significantly high - 28.7%, 22.0%, 23.6% respectively.

When analyzing serologic tests to *Toxoplasma gondii* (*T. gondii*) immunoglobulin of G class (IgG) most common among mothers (6.0%). The analysis shows the prevalence of IgG to T. gondii in all three CHD groups – 5.5%, 9.8%, 5.7% respectively (table 3).

Table 1

Antibodies to *Chlamidia trachomatis* and CHD groups

CHD groups	Antibodies to *Chlamidia trachomatis* (p=0.067)			
	No antibodies. %	High level of IgM. %	High level of IgG. %	High level of Ig class M+G. %
1) (n=407)	66.6	5.2	26.5	1.7
2) (n=64)	56.2	1.6	42.2	0.0
3) (n=172)	68.6	5.8	22.7	2.9
Total (n=643)	66.1	5.0	27.1	1.9

Table 2

Antibodies to *Chlamidia pneumonia* and CHD groups

CHD groups	Antibodies to *Chlamidia pneumoniae* (p=0.261)			
	No antibodies. %	High level of IgM. %	High level of IgG. %	High level of Ig class M+G. %
1) (n=415)	58.6	9.4	28.7	3.4
2) (n=59)	67.8	8.5	22.0	1.7
3) (n=174)	69.0	5.2	23.6	2.3
Total (n=648)	62.2	8.2	26.7	2.9

Table 3

Antibodies to *Toxoplasma gondii* and CHD groups

CHD groups	Antibodies to *T. gondii* (p=0.553)		
	No antibodies. %	High level of IgM. %	High level of IgG. %
1) (n=362)	93.1	1.4	5.5
2) (n=61)	90.2	0.0	9.8
3) (n=159)	93.7	0.6	5.7
Total (n=582)	93.0	1.0	6.0

Таблица 4

Antibodies to cytomegalovirus CMV and CHD groups

CHD groups	Antibodies to CMV (p=0.343)			
	No antibodies, %	High level of IgM, %	High level of IgG, %	High level of Ig class M+G, %
1) (n=380)	12.4	15.3	69.2	3.2
2) (n=63)	9.5	9.5	79.4	1.6
3) (n=172)	14.0	8.7	74.4	2.9
Total (n=615)	12.5	12.8	71.7	2.9

The analysis of serologic tests to cytomegalovirus (CMV) revealed high prevalence of cytomegalovirus in mothers. In whole selection of CHD with serologic test to CMV 87.4% cases were revealed, immunoglobulin of class G (IgG – 71.7%) was most common. When analyzing the initial CHD groups the prevalence of IgG to CMV in all three groups was noticed - 69.2%, 79.4%, 74.4% respectively (table 4).

When analyzing serologic test to herpes simplex we revealed high prevalence of herpes simplex infection in mothers of CHD children. In whole selection of CHD with serologic test to *Herpes simplex* 87.5% cases were revealed, the most significant level was G class of immunoglobulin (IgG – 70.3%). When analyzing the initial CHD groups the prevalence of IgG to *Herpes simplex* in all three groups was noticed - 66.9%, 89.9%, 75.6% respectively (table 5).

Thus, we have obtained the following results as high prevalence of cytomegalovirus infection (n=615, 87.4%), herpes simplex virus (n=489, 87.5%), mean prevalence of *Chlamidia pneumonia* infection (n=648, 37.8%), *Chlamidia trachomatis* (n=643, 34.0%), and low prevalence of Toxoplasma gondii infection (n=582, 7.0%), among neonates born with CHD.

Old acute respiratory viral infections turned to be most common among exogenous infectious factors. Total specific weight resulted in 16.4%. It is acute respiratory viral infection at early terms of pregnancy (before the 12th week), at the 28th week and later, including all terms of pregnancy, that resulted in CHD.

According to the results of the research, the structure of exogenous infectious factors in all selection of CHD (n=1824) was the following: acute respiratory viral infection before 12th week of pregnancy – 11%, acute respiratory viral infection at the 28th week and later – 4.4%, other infectious factors 2.0%, chronic viral hepatitis B – 1.6%, acute respiratory viral infection at all terms of pregnancy – 1.0%, chronic viral hepatitis C – 0.7%.

According to the table 6, in a group with confirmed CHD 13.7% cases are caused by acute respiratory viral infection, in 4.7% at the 28th week of pregnancy and later, 1.8% caused by viral hepatitis B, 2.9% of cases result from other infectious factors as: old syphilis, herpes infection before the 12th week of pregnancy, parental tuberculosis, rubella contact, helminthic invasion, diphyllobothriasis, maternal brucellosis, chicken pox before the 12th week of pregnancy, recurrent syphilis.

Table 5

Antibodies to Herpes simplex and CHD groups

CHD groups	Antibodies to Herpes simplex (p=0.123)		
	No antibodies. %	High level of IgM. %	High level of IgG. %
1) (n=323)	13.0	20.1	66.9
2) (n=47)	8.5	10.6	80.9
3) (n=119)	12.6	11.8	75.6
Total (n=489)	12.5	17.2	70.3

Table 6

Exogenous infectious factors and CHD groups

Factors	CHD groups (p=0.342)			
	1) (n=1013) %	2) (n=184) %	3) (n=627) %	4) (n=1824) %
0	79.5	85.3	75.4	79.3
1	9.4	10.3	13.7	11.0
2	4.7	2.2	4.5	4.4
3	1.1	0.0	1.1	1.0
4	1.6	1.1	1.8	1.6
5	0.8	0.5	0.6	0.7
6-15	2.9	0.6	2.9	2.0

Note. 0 – absence of exogenous infectious factors; 1 – acute respiratory viral infection before the 12th week of pregnancy; 2 - acute respiratory viral infection from the 28th week of pregnancy and later; 3 - acute respiratory viral infection at all terms of pregnancy; 4 – chronic viral hepatitis B; 5 – chronic viral hepatitis C; Other infectious factors: 6 – old syphilis; 7 – herpes infection before the 12th week of pregnancy; 8 – parental tuberculosis; 9 – rubella contact; 10 – chronic bronchitis; 11 – helminthic invasion, diphyllobothriasis; 12 - maternal brucellosis, 13 - chicken pox before the 12th week of pregnancy, 14 – paternal tuberculosis; 15 - recurrent syphilis.

Conclusion. A research of the role of pathogenic exogenous factors at all terms of pregnancy and their possible association with CHD development in neonates of the Republic Sakha(Yakutia) revealed high prevalence of cytomegalovirus infection (n=615, 87.4%), herpes simplex virus (n=489, 87.5%) in CHD neonates. Moreover, there is a high risk for CHD development in a case of acute respiratory viral infection at early terms of pregnancy noticed in a group of possible CHD occurrence (13.7%). Thus, the research of risk factors for CHD development becomes fundamental for pregravid preparation.

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FEATURES OF NORTHERN LONGEVITY: LONG LIVERS OF YAKUTSK

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The social portrait of the Yakutsk long-livers is compiled based on the primary data analysis. Long-livers, who spent their childhood and youth in the war years, are still not clearly defined as a separate group in many scientifical areas. An interdisciplinary approach revealed the history of life, gender and psychological differences of people 90 years of age and older in order to identify common and stable characteristics of the portrayed group.

It has been established that most of the long-livers of Yakutsk are not indigenous, while a significant part of the respondents had a family life of more than 30 years, and labor character in adulthood was associated with mental work or light physical labor. The majority of the old people continued to take care of themselves on their own, with every third leading the household alone. Sexual life in women ceased at 59.4 ± 2.0 years, in men - 72.1 ± 2.1 years. Compared with the long-lived people of the previous generation, the number of smokers has significantly decreased, and the proportion of people performing active lifestyle has increased. Nevertheless, arterial hypertension was detected in almost all examined patients, whereas in earlier studies this indicator was significantly lower.

Keywords: somatometric indicators, anamnesis vital, non-indigenous and indigenous population, social portrait of long-livers.

Introduction. In Yakutia, the population has always been "rejuvenated" due to migrants arriving at working age. In 1989, the population aged 60 and over was 4.9%, then by 2012 this indicator reached 12.7%, most possibly due to the emigration peak in the 1990s. In the last decade, the number of 90 years old and more has grown markedly. So, in 2010 there were 316 people, and at 01.01.2019, 951 people were registered, including 404 people in outpatient clinics in Yakutsk. We considered it inappropriate to compare with the data of earlier censuses (1928, 1950, 1970). In these years, due to various circumstances, significant distortions of the considered age cohorts were observed [1].