

RISK FACTORS FOR PNEUMONIA IN CHILDREN WITH CONGENITAL HEART DEFECTS

¹Akhmedova I.M., ²Musurmonov K.A.

^{1,2}Tashkent Pediatric Medical Institute, Tashkent

<https://doi.org/10.5281/zenodo.11097993>

Abstract. *To identify risk factors for the development of pneumonia in children against the background of congenital heart defects.*

Materials and methods of research: 45 children aged from 1 year to 3 years were examined. Of these, 25 children with community-acquired pneumonia due to congenital heart disease (group I) and 20 children with community-acquired pneumonia without congenital heart disease (group II). To solve these problems, the following generally accepted and special clinical, functional and laboratory research methods were performed.

Results: The research results showed that among the identified clinical variants of congenital heart defects, there were 14 (56%) children with VSD, 20% of children with ASD, 16% of children with combined defects and 8% of children with PDA.

The study of medical and biological factors showed that in children of the 1st group girls predominated (60%), in the 2nd group boys were more common (75%). The mother's age was over 35 years at the time of the birth of this child, which prevailed in 1 group of children (24%) and in 16% of children the parents were close relatives. In children of group 1, in fact, among concomitant diseases, children with rickets prevailed in 80%, children with PPNS 48%, children with neurocirculatory dystonia 60%, and children with hip dysplasia in 24% of children.

Keywords: children, congenital heart defects, risk factors, pneumonia.

RELEVANCE

In recent years, there has been an increase in the incidence of congenital heart defects, which is associated not only with a true increase in this pathology, but also with the widespread introduction of highly informative instrumental methods for studying the heart, primarily Doppler echocardiography [1,2,3]. Congenital heart defects (CHD) are developmental anomalies that rank third after malformations of the central nervous system and malformations of the musculoskeletal system. More than 350 types of congenital defects are known, and many heart defects are so complex in their anatomical combination that children die from their complications at very early stages of life, often even during the neonatal period.

It is known that frequent respiratory infections in patients with congenital heart disease often lead to the development of pneumonia against the background of chronic congestion of the lungs (for defects with increased pulmonary blood flow) or chronic hypoxia (for defects with reduced pulmonary blood flow).

Most often, pneumonia with defects with increased pulmonary blood flow occurs in the first year of life, has a protracted course, and is difficult to treat. Therefore, in this situation, a timely assessment of the sick child's condition and high-quality therapy are required, taking into account hemodynamic disorders and the morphological form of pneumonia [5,6,7].

Pathology of the respiratory tract traditionally has a high share in the structure of morbidity in children of all age groups, but at an early age it can account for up to 80% of all cases. Pneumonia occupies a special place among acute and chronic respiratory diseases as one of the

main reasons for hospitalization of children in the pulmonology department, the possibility of developing life-threatening complications and even death.

Despite the fact that over the past decades, significant advances have been made in its diagnosis and treatment in our country and in the world, this disease still remains an acute problem not only in pulmonology, but also in pediatrics in general.

Thus, according to WHO data, about 155 million cases of pneumonia in children are registered annually in the world, and approximately 1.4 million of them die under the age of five years [8,9].

Currently, according to domestic authors, about 15-20 per 1000 children in the first three years of life and about 5-6 per 1000 children over 3 years of age suffer from pneumonia annually [10,11,12].

Based on the above, the purpose of the study was to identify risk factors for the development of pneumonia in children against the background of congenital heart defects.

MATERIALS AND METHODS OF RESEARCH

To solve these problems, we examined 45 children aged from 1 year to 3 years. Of these, 25 children with community-acquired pneumonia due to congenital heart disease (group I) and 20 children with community-acquired pneumonia without congenital heart disease (group II).

Children were examined at the base in the departments of pulmonology and cardiorheumatology of the Republican Specialized Scientific and Practical Medical Center of Pediatrics (RSNPMCP) and at the clinics of the Tashkent Pediatric Medical Institute (TashPMI).

The diagnosis was made on the basis of complaints, anamnesis (obstetric history of the mother, history of life and illness of the child, previous diseases, nature of the course and duration of the disease), clinical and functional (ECG, EchoCG), laboratory (general hematological analysis, coagulogram, biochemical blood test, C-reactive protein, activity of tissue enzyme lactate dehydrogenase, creatine phosphokinase, rheumatic test) examination methods.

To study development factors, all children were distributed depending on medical and biological factors (gender, maternal age, heredity, consanguineous marriage, maternal history)

The growth and development of children was assessed according to the standards of growth and development of children recommended by WHO (2006; 2009).

Anthropometric data: body weight, height and BMI or MRI (body mass index or weight-height index - kg/m²) were applied to WHO growth curves and a child curve was obtained.

RESULTS AND ITS DISCUSSION

The distribution of children by age showed that children in groups 1 and 2 almost did not differ in age; the average age was 23.8 ± 1.8 and 23.6 ± 1.7 months. Distribution of children by weight: children in group 1 had low weight (10.1 ± 0.4 kg) compared to children in group 2 (12.6 ± 0.4 kg), which means children with congenital heart disease are lagging behind in physical development (Table 1).

The distribution of children by gender was determined that, in contrast to the 2nd group of children, in the 1st group girls prevailed 60% to 40%, and in the 2nd group boys prevailed 75% to 25%.

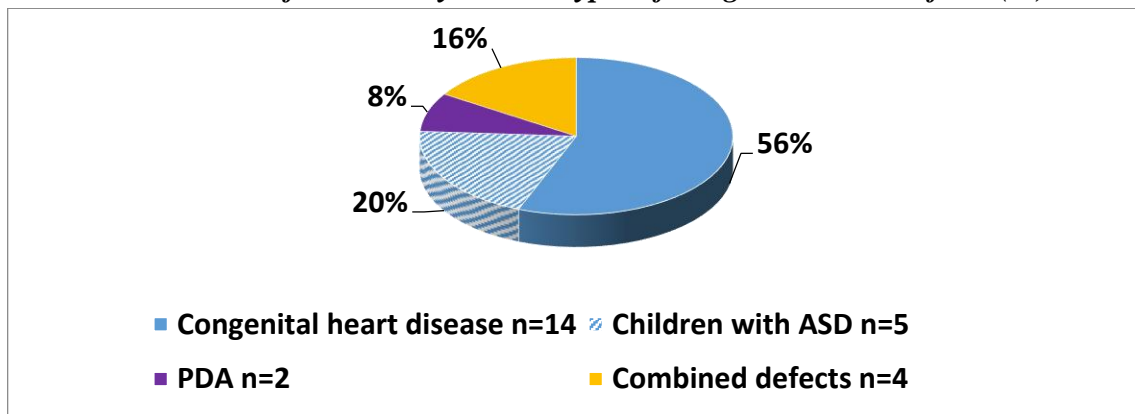
Table 1. Distribution of children according to medical and biological characteristics

Signs	1 group Children with pneumonia+CHD (n=25)	2nd group Children with pneumonia without congenital heart disease (n=20)
Average age (months)	23,8±1,8	23,6±1,7
Average weight (kg)	10,1±0,4	12,6±0,4
Boys abs.(%)	10 (40%)	15 (75%)
Girls abs.(%)	15 (60%)	5 (25%)

The children were distributed depending on the clinical variants of congenital heart disease (Diagram No. 1).

Diagram No. 1

Distribution of children by clinical types of congenital heart defects (%)



The research results showed that among the identified clinical variants of congenital heart disease, there were 14 (56%) children with VSD, 20% of children with ASD, 16% of children with combined defects and 8% of children with PDA.

As is known, the birth of children with various diseases and congenital anomalies, as well as their subsequent development and health status depend on the course of pregnancy, the nature of childbirth and the health status of their mothers.

An analysis of obstetric history showed that mothers of children in group 1 suffered from acute respiratory viral infections during pregnancy in 80.0% of cases, and TORCH infections (cytomegalovirus, herpes virus) were detected in 72.0% of cases; 20.0% have stage I preeclampsia, 32% of mothers have premature birth, 16% of mothers have stillbirths during previous pregnancies, and 16% of mothers have miscarriages in the first and second trimesters of pregnancy (Diagram No. 2).

Heredity and diseases suffered during pregnancy act as etiological factors and play a role in the pathogenesis of any human disease, however, the share of their participation in each disease is different, and the greater the share of one factor, the less the contribution of the other.

The results of studying hereditary burden in children are presented in Table 2

Diagram No. 2
Obstetric history data of mothers of children %

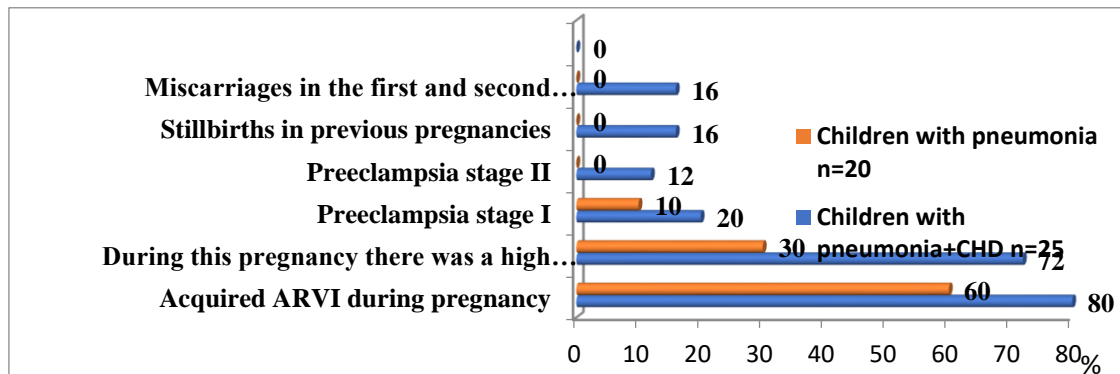


table 2

Hereditary burden in children

Diseases in relatives	Group 1 n=25		Group 2 n=20	
	Abs.	%	Абс.	%
Acute myocardial infarction	2	8,0	1	5
Congenital heart defect	2	8,0	-	-
Heart rhythm disturbances	3	12	2	10
Myocarditis of various origins	1	4,0	1	5

As can be seen from Table 2, 32% of children in group 1 had congenital and acquired diseases of the cardiovascular system in their families.

The features of clinical manifestations of pneumonia in children of group 1 with congenital heart disease depend on the degree of pulmonary hypertension (PH). In children with stage I PH, the following clinical data were noted: pale skin, osteoarticular system: oblique occiput, rachitic rosary, Harrison's groove. Muscular system strength and tone are normal. Dyspnea mixed with a predominance of inspiratory dyspnea. Percussion in the lungs shortens the pulmonary sound. Auscultation in the root zones against the background of weakened breathing reveals dry buzzing wheezing. Palpation of the apical impulse is diffuse.

Borders of relative cardiac dullness: right - 1 cm outward from the parasternal line, left - 1 cm outward from l. mamillaris, upper - II rib. Auscultation: heart sounds are muffled and rhythmic. When listening along the left edge of the sternum in the III-IV intercostal space, a systolic murmur is heard from the punctum maximum III intercostal space. Accent of tone II over arteria pulmonalis. The liver is enlarged, the edge is rounded, the consistency is soft, the surface is smooth.

In children with I-II degrees of PH, the following clinical indicators were recorded: pale skin, osteoarticular system: oblique occiput, rachitic rosary, Harrison's groove.

Muscular system strength and tone are normal. Dyspnea mixed with a predominance of inspiratory dyspnea. Percussion in the lungs shortens the pulmonary sound. Auscultatory weakened breathing. Palpation of the apical impulse is diffuse. Borders of relative cardiac dullness: right - 1.5 cm outward from the parasternal line, left - 1 cm outward from l. mamillaris, upper - II rib. Auscultation: heart sounds are muffled and rhythmic. When listening along the left edge of the sternum in the III-IV intercostal space, a systolic murmur is heard from the punctum maximum of the III intercostal space. Accent of tone II over arteria pulmonalis. The liver is enlarged, the rim is rounded, the consistency is soft, the surface is smooth.

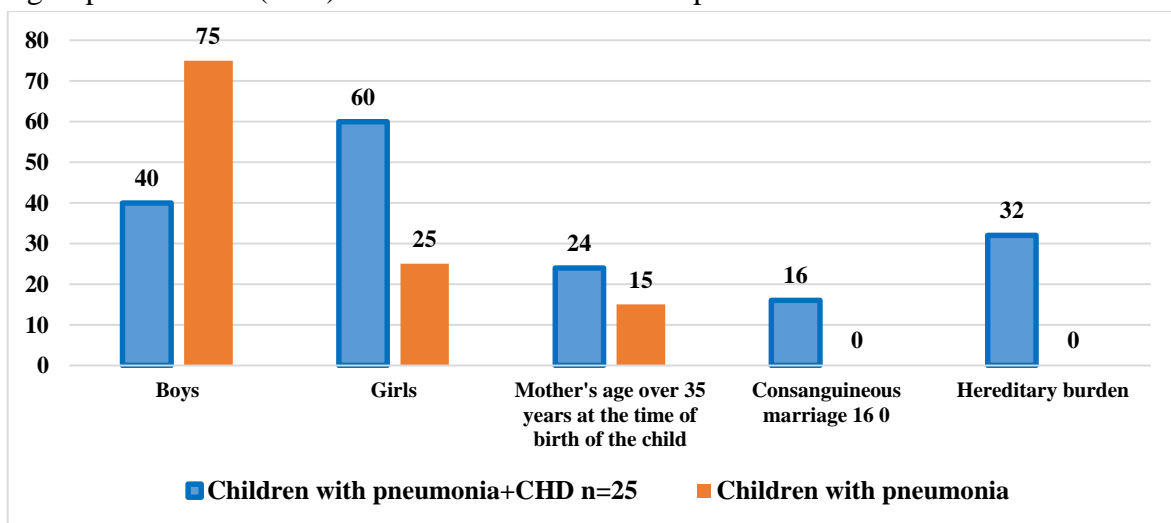
Thus, an increase in the degree of PH is observed in the combination of two and three congenital heart defects with a left-to-right shunt in one patient.

Analysis of the data in Table 3 shows that in children of group 1, among concomitant diseases, children with rickets prevailed in 80%, children with PPNS 48%, children with neurocirculatory dystonia 60%, and children with hip dysplasia in 24% of children.

Table 3. Frequency of comorbidities (%)

Diseases	"1st grade pneumonia + VPS (n=25)"	"2nd grade pneumonia (n=20)"
	abs. %	abs. %
Rickets	20(80%)	6(30%)
PPPNS	12(48%)	5(25%)
Cardiopsychoneurosis	15(60%)	4(20%)
Hip dysplasia	6(24%)	-

The study of medical and biological factors showed that in children of the 1st group girls predominated (60%), in the 2nd group boys were more common (75%). Also, great importance was the age of the mother over 35 years old at the time of the birth of this child, which prevailed in 1 group of children (24%) and in 16% of children the parents were close relatives.



Thus, the results of the study showed that risk factors for the development of pneumonia in children with congenital heart defects include such factors as medical and biological factors, obstetric history, maternal illnesses during pregnancy, and illnesses during pregnancy.

REFERENCES

1. Avdeev S.N. Pulmonary hypertension in chronic respiratory diseases. Respiratory medicine. Edited by A.G. Chuchalin.// M.: GEOTAR-Media, 2017. T. 2, 177-197
2. Alekseeva V.V., Vetvitskaya I.M., Samsygina G.A. // IV Russian National Congress “Man and Medicine”. April 19-23 Moscow. Abstracts of reports. M., 2011. P. 229.
3. Aleksi-Meskhashvili V.V. Hemodynamics, acid-base balance and blood gases in the immediate postoperative period in patients with congenital heart defects operated on under artificial circulation // Cand. diss. - 2012.
4. Barlybaeva N.A., Strukov V.I., Sokolova Z.V. Clinical and morphological characteristics of pneumonia in young children against the background of congenital heart disease.// - Alma-Ata. 2015, pp. 392-393.
5. Bekarova A.M. Chlamydial infection in newborns and children of the first year of life. // Diss. Ph.D. honey. Sci. -M. 2002.
6. Belenkov Yu.N., Preobrazhensky D.V., Sidorenko B.A., Batyraliev T.A., Pulmonary hypertension and right ventricular heart failure.// - M.: NEWDIAMED; 2019, p. 374.
7. Belozеров Yu.M. Pediatric cardiology// -M.: MEDpress-inform, 2014, - p. 600.
8. Belozеров Yu.M., Strakhova O.S. Congenital heart defects in children (genetic and environmental factors of occurrence).// M.: Moscow Research Institute of Pediatrics and Pediatric Surgery, Ministry of Health of the Russian Federation, 2012.
9. Belozеров Yu.M., Strakhova O.S. Pharmacotherapy of cardiovascular diseases in children.// M.: 2010. pp. 70-95.
10. Belokon N.A., Kuberger M.B. Heart and vascular diseases in children: a guide for doctors. In 2 T.//T.2. M. Medicine, 1987.
11. Belokon N.A., Podzolkov V.P. Congenital heart defects.// - M: “Medicine”, 2019.
12. Berishvili D.O. Long-term results of radical correction of multiple VSDs in children of the first year of life // Bulletin of the Scientific Center for Cardiovascular Surgery named after. A.N. Bakuleva RAMS. - 2014. - p. 137.
13. Berishvili D.O. Palliative operations without artificial circulation as a means of emergency care for newborns with congenital heart defects. // Doc. Diss. M. - 2010
14. Bockeria L.A., Vishnyakova M.V., Makarenko V.N. and others. Pathology of the lungs with congenital heart defects in infants: modern radiation diagnostics and clinical aspects // Children's diseases of the heart and blood vessels. - 2015. - No. 2. - pp. 22-29.