Brief Report

Frequency of detection of congenital heart diseases in different regions of Kyrgyz Republic

Taalaibek Z. Kudaiberdiev, Irina A. Akhmedova, Gulzada A. Imanalieva , Gulnaz T. Tursunbekova , Kayirnisa T. Tilemanbetova
Scientific Research Institute of Heart Surgery and Organ Transplantation, Bishkek, Kyrgyz Republic

Abstract

In this article, we present preliminary results of screening for congenital heart diseases (CHD) in Kyrgyz Republic. Pilot project for early diagnostics of CHD, launched in this year, shows initial results of screening in remote areas of our country.

Key words: congenital heart diseases, screening

(Heart Vessels and Transplantation 2017; 1: doi: 10.24969/2017.13)

According to systematic reviews and meta-analysis of ACC AHA (1) there is a significant upsurge of CHD from 0,6 cases in 1930 – 1934 up to 9,1 cases for 1000 newborns after 1995. Wherein, this growth was not linear. First abrupt growth of CHD was in period between 1930 and 1960 with stabilization at 5,3 for 1000 alive newborns. Second abrupt growth of CHD was in period between end of 1970 and 1995 with stabilization at 9,1 for 1000 alive newborns. Also, there are geographical differences. The highest rate of CHD frequency was noted in Asia 9,3 cases for 1000 newborns, and the lowest rate was noted in Africa – 1,9 cases for 1000. Europe is at the second place in frequency of CHD with 8,2 cases for 1000.

Congenital heart diseases (CHD) are at the 3rd place amongst death causes in children following nervous system and musculoskeletal apparatus disease. CHD are widely spread around the world (2). Though the previous reports did not find neither time no country based difference in prevalence of CHD (4), latest reports shows increase in prevalence of CHD (1, 5). According to latest data, frequency of CHD has significantly raised and achieved nine cases per 1000 alive newborns in the last years, affecting 1,35 million of 150 mln newborns annually and posing an important problem for healthcare (1-3). Such a high rate of CHD, most likely, associated with wide spread tradition of marriages between close relatives (6) and other causes. There are reasons to suppose that this growth of CHD frequency can be caused by improvement of diagnostics and screening of the cardiac disorders in newborns. Particularly, routine use of echocardiography has led to growth of newly diagnosed of CHD in the adults and in asymptomatic persons. In addition, supposedly, the growth of diagnosed CHD can be caused not only by improvement of technical equipment, but with increase in proportion of the aged mothers.

Address for Correspondence: Taalaibek Z. Kudaiberdiev, MD, DSc, Scientific Research Institute of Heart Surgery and Organ Transplantation, Bishkek, Kyrgyz Republic, Email: tkudaiberdiev@gmail.com
Received: 15.12.2016 Accepted: 15.04.2017

We suppose that improving of techniques of management in the "complicated" pregnancies can make input to early diagnosis of CHD in newborns. Women with CHD are in high risk of giving birth to children with CHD (6).

CHD in newborns and children is associated with an extremely high death rate. According to the data from Novosibirsk 29% of newborns with CHD die at the end of 1st week of life, 42% die at the end of 1st month, and 87% die at the end of 1st year if left without intervention (7). In USA for the period of 1999-2006 the mortality rate for CHD was 1.20 per 100,000, and 48.1% accounted for infant mortality, though the mortality rate declined by 24.1% (8). Data on prevalence of CHD in Asia are scarce and report from India showed prevalence of CHD ranging between 0.8-5.2 per 1000 with leading type of CHD – ventricular septal defect (VSD), followed by atrial septal defect (ASD), patent ductus arteriosus (PDA), tetralogy of Fallot (TOF), coarctation of aorta and pulmonary atresia (9).

In Kyrgyz Republic early diagnosis and referral to specialized care of children with CHD in rural and remote areas is a challenging issue, most likely due to complicated economic conditions. There is only one specialized Institute - Research Institute of Heart Surgery and Organ Transplantation, Bishkek, Kyrgyz Republic, which provides high-quality medical care for adult and pediatric patients with CHD. Often patients admitted to our center are at the advanced stages of disease with complications when only palliative medical treatment could be applied. The situation is worsened by lack of qualified specialists in rural areas. There is no accurate statistical data about prevalence of CHD in Kyrgyz Republic.

We aimed to present preliminary data on of frequency and types of CHD in children, obtained through screening programs for CHD in remote areas of Kyrgyz Republic in order to improve quality of specialized medical care.

We examined (team: 2 cardiac surgeons, 2 specialists on cardiac imaging and pediatric cardiologist) children from different regions of country. Examinations were carried out in pediatric departments of tertiary hospitals, maternity hospitals and shepherd high-altitude camps (Jailoo) of Issyk-Kul, Chui, Talas, Jalal-Abad and Batken regions of Kyrgyz Republic (Fig. 1-3). All children underwent physical examinations and echocardiography using Phillips CX-50 apparatus with sector/phase array probe for adult and pediatric cardiovascular examinations 1-12 Mhz according to standards set by ASE (10).

Overall, 710 children were screened in different regions including 197 newborns, and 513 children of junior pre-school age. We also present data on 1096 (including 465 newborns) patients referred to our center for CHD evaluation.

In Issyk-Kul region, among 48 newborns 2 had CHD and among 118 children 4 were diagnosed as having CHD. In Chui region among 59 newborns there was only 1 case of CHD, while among 119 children of junior preschool age 4 children had CHD. In Talas region, among 35 newborns – one had CHD, and one case of congenital heart defect was among 94 junior preschool age children. In Jalal-Abad and Batken regions, CHD was detected in 4 newborns out of 55 observed, and in the junior preschool group in 32 children among 182 screened, including 22 from Batken region (Table 1).

Table 1. Number of cases with CHD by region				
Number of cases with CHD/total screened by region	**Issik-Kul**	**Chui**	**Talas**	**Jalal-Abad/Batken**
Newborns (n=197)	2 of 48	1 of 59	1 of 35	4 of 55
Children (n=513)	4 of 118	4 of 119	1 of 94	32 of 182 (10– Jalal-Abad 22 - Batken)

Table 2. Types of CHD disorders detected during screening in different regions f Kyrgyz Republic									
Screened children	**VSD**	**ASD**	**VSD+ PDA**	**ASD+ PDA**	**PDA/ PFO**	**PFO**	**Bicuspid AV**	**MVP**	**Peric. eff.**
Newborns (n=197)	2	4	1	1	96		-	-	-
Children (n=513)	32	4	-	-	-	1	1	3	3
ASD – atrial septal defect, AV – aortic valve, CHD – congenital heart disease, eff. – effusion, MVP – mitral valve prolapse, Peric. –pericardial, PDA – patent ductus arteriosus, PFO – patent foramen ovale, VSD – ventricular septal defect									

Among all examined 197 newborns the following types of CHD were found (Table 2): 2 cases of VSD, 4 cases of ASD, 1 case of combined VSD and PDA, 1 case of combined ASD and PDA. Patent ductus arteriosus and patent foramen ovale (PFO) were revealed in 96 newborns.

In the junior pre-school group 41 of 513 had CHD – 4 cases of ASD, 4 cases of PDA, 20 cases had VSD with minimal interventricular flow, 12 patients had perimembranous VSD, 1 patient had bicuspid aortic valve and in 1 case PFO was detected. In 3 cases mitral valve prolapse with minimal regurgitation was diagnosed and 3 toddlers with lung pathology had pericardial effusion.

Overall, 1096 children (including 465 newborns) from different parts of republic were referred to SRI of Heart Surgery and Organ Transplantation with suspicion for CHD during 9-month period (Table 3). CHD was confirmed in 146 cases (13.32%): two of them had hypoplastic left heart syndrome (1.36%), 24 (16.43%) VSD in different localizations, 46 (31.5%) had ASD, 11 (7.53%) - pulmonary stenosis of different severity, 18 (12.32%) had combination of VSD and ASD, 38 (26.0%) – PDA, 3 (2.05%) tetralogy of Fallot, 1(0. 68%) - total anomalous pulmonary venous connection and 3 (2.05%) patients had complete form of atrio-ventricular communication.

Table 3. Types of CHD disorders diagnosed in children referred for CHD evaluation at SRI of Heart Surgery and Organ Transplantation									
	VSD	**ASD**	**VSD+ ASD**	**PDA**	**PS**	**Complete A-V comm.**	**TOF**	**HLHS**	**TAPVC**
Children (n=146), n(%)	24 (16.4)	46 (31.5)	18 (26.0)	38 (26.0)	11 (7.53)	3 (2.05)	3 (2.05)	2 (1.36)	1 (0.68)
ASD – atrial septal defect, A-V – atrioventricular, CHD – congenital heart disease, comm. – communication, HLHS – hypoplastic left heart syndrome, PDA – patent ductus arteriosus, PS – pulmonary stenosis, TAPVC – total anomalous pulmonary venous connection , TOF – tetralogy of Fallot, VSD – ventricular septal defect									

Figure 1. Examination of children at Jailoo in Issyk-Kul region

Figure 2. Examination of children in Batken region

Figure 3. Examination of children in Talas region

Our study has limitations intrinsic to its descriptive design, there is no sampling of population, being preliminary and it represents the results of screening performed and being conducted at current time as well in different rural and remote regions on demand where there is a need for providing diagnostic care and referral children to specialized canter for correction of CHD. At the same time, our brief report raises the research question on prevalence of CHD among children in Kyrgyz Republic.

Thus, results of initial diagnostic procedures in remote regions of Kyrgyz Republic revealed different frequency of CHD with tendency for increasing in Southern regions. High rate of newly diagnosed CHD in SRI of Heart Surgery and Organ Transplantation may be explained by the referral of symptomatic patients from different regions of country.

Peer-review: Internal review

Conflict of interest: None to declare

Authorship: T.Z.K., I.A.A., G.A.I., G.T.T., K.T.T. equally contributed to the preparation of manuscript and study.

References

1. van der Linde D, Konings EE, Slager MA, Witsenburg M, Helbing WA, Takkenberg JJ, Roos-Hesselink JW. Birth prevalence of congenital heart disease worldwide: a systematic review and meta-analysis. J Am Coll Cardiol 2011; 58: 2241-7.

2.Edler I, Lindstrom K. The history of echocardiography. Ultrasound Med Biol 2004: 30: 1565-644.

3.Hoffman JI. Incidence of congenital heart disease: I. Postnatal incidence. Pediatr Cardiol 16 1995:16; 103-13.

4. Hoffman JIE, Kaplan S. The incidence of congenital heart disease. J Am Coll Cardiol 2002; 39:1890 –900.

5. CDC report: Congenital Heart Disease. Available at: URL:https://www.cdc.gov/ncbddd/heartdefects/data.html

6. Naderi S.Congenital abnormalities in newborns of consanguineous and Nonconsanguineous parents. Obstet Gynecol 1979; 53 : 195-9.

7. Data Novosibirsk research institute of blood circulation pathology by Y.N. Meshalkin. Available at: URL: http://www.childrenshearts.org.uk/otherpage/novosibirsk.html

8. Gilboa SM, Salemi JL, Nembhard WN, Fixler DE, Correa A. Mortality Resulting From Congenital Heart Disease Among Children and Adults in the United States, 1999 to 2006. Circulation 2010; 122: 2254–63.

9. Saxena A. Congenital heart disease in India: a status report. Indian J Pediatr 2005; 72: 595-8.

10. Lopez L, Colan SD, Frommelt PC, Ensing GJ, Kendall K, Younoszai AK, et al. Recommendations for quantification methods during the performance of a pediatric echocardiogram: a report from the Pediatric Measurements Writing Group of the American Society of Echocardiography Pediatric and Congenital Heart Disease Council. J Am Soc Echocardiogr 2010; 23: 465-95.