

Prevalence of congenital heart disease according to the echocardiography findings in 8145 neonates, multicenter study in southern Iran

Seyede Yasamin Parvar¹  | Rezvan Ghaderpanah¹  | Amir Naghshzan² 

¹Student research committee, Shiraz University of medical sciences, Shiraz, Iran

²Cardiovascular and Neonatology research center, Shiraz University of Medical Sciences, Shiraz, Iran

Correspondence

Amir Naghshzan, Cardiovascular and Neonatology research center, Shiraz University of Medical Sciences, Zand St, Shiraz, Iran.

Email: amirnaghshzan@gmail.com

Abstract

Introduction: Congenital heart disease (CHD), the lethal congenital anomaly in newborns, is multifactorial, with environmental and genetic factors contributing to its occurrence. Although some studies on the prevalence of CHD have been conducted throughout the country, this large-scale study aims to provide information on the prevalence of various types of CHDs in newborns according to the echocardiography findings.

Patients and Methods: Over 3 years, 8145 neonates with suspected CHD who underwent echocardiography by a trained pediatric cardiologist were included in this multicenter, cross-sectional observational study. CHD was categorized into two major groups; cyanotic and acyanotic heart disease. The SPSS version 22 software was used to analyze the data with a significance level set at 0.05.

Results: Of 8145 neonates who were referred to our centers with CHD symptoms, 6307 were indicated for echocardiography. The mean age of the studied population was 8.5 ± 9.3 days and the male-to-female ratio was 2.6, especially in the arterial septal defect (ASD), ventricular septal defect (VSD), and patent ductus arteriosus (PDA) groups. 77.2% of patients had acyanotic heart disease (100 in 1000 neonates) with ASD as the most common one and 9% were diagnosed with cyanotic heart disease (11 in 1000 neonates) with transposition of the great arteries as the most common form and the aortopulmonary window was the rarest form.

Conclusion: This large prospective, multicenter screening study reported arterial septal defect (85%) and patents with ductus arteriosus (32%) as the most frequent type of CHD. Moreover, the prevalence of male patients was significantly higher. This information would be helpful for health policy makers, stakeholders, and general practitioners in regions where there are no trained pediatric cardiologist fellowships and limited access to echocardiography devices for better management of CHD.

KEYWORDS

congenital heart disease, echocardiography, epidemiology, Iran, pediatrics

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *Health Science Reports* published by Wiley Periodicals LLC.

patents with ductus arteriosus (32%). Inconsistent with other studies conducted in Iran, our study reported that acyanotic heart diseases were the most common forms of CHD among neonates. Moreover, the prevalence of male patients was significantly higher. This study provides valuable information about the prevalence and types of CHD among neonates in Iran. By taking into account the unique characteristics of this population, policymakers and healthcare providers can develop effective interventions that reduce the burden of CHD and improve the overall health outcomes of neonates with CHD. Further research is needed to better understand the underlying risk factors and causes of CHD among neonates in Iran.

AUTHOR CONTRIBUTIONS

Seyedeh Yasamin Parvar: Conceptualization; data curation; investigation; resources; writing—original draft; writing—review and editing. **Rezvan Ghaderpanah:** Formal analysis; writing—original draft; writing—review and editing. **Amir Naghshzan:** Conceptualization; data curation; investigation; supervision.

ACKNOWLEDGMENTS

The authors would like to express gratitude to Pediatrics' cardiology department and the **center for developing clinical research in Namazee hospital, Shiraz, Iran, for their editorial assistance.**

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data supporting the present study's findings are available on request from the corresponding author. However, they are not publicly available due to privacy and ethical restrictions.

ETHICS STATEMENT

The manuscript has been approved by all authors and has never been published or under the consideration for publication elsewhere. We confirm that all figures and tables are original and created by authors. We guarantee that all authors listed on the title page have read the manuscript and attest to the validity and legitimacy of the data. We would also like to undertake that we have read the plagiarism policy and submitted the article with complete responsibility. The Medical Ethics Committee of Shiraz University of Medical Sciences according to the declaration of Helsinki (IR. SUMS. REC.1399.1338).

TRANSPARENCY STATEMENT

The lead author Amir Naghshzan affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Seyedeh Yasamin Parvar  <http://orcid.org/0000-0002-3027-1843>

Rezvan Ghaderpanah  <http://orcid.org/0000-0002-4274-4628>

Amir Naghshzan  <http://orcid.org/0000-0001-7647-178X>

REFERENCES

- Pinto Júnior VC, Branco KMPC, Cavalcante RC, et al. Epidemiology of congenital heart disease in Brazil. *Revista Brasileira de Cirurgia Cardiovascular*. 2015;30(2):219-224. doi:10.5935/1678-9741.20150018
- van der Linde D, Konings EEM, Slager MA, et al. Birth prevalence of congenital heart disease worldwide. *JACC*. 2011;58(21):2241-2247. doi:10.1016/j.jacc.2011.08.025
- Apostolopoulou SC, Manginas A, Kelekis NL, Noutsias M. Cardiovascular imaging approach in pre and postoperative tetralogy of fallot. *BMC Cardiovasc Disord*. 2019;19(1):7. doi:10.1186/s12872-018-0996-9
- Vecoli C, Pulignani S, Foffa I, Andreassi M. Congenital heart disease: the crossroads of genetics, epigenetics and environment. *Curr Genomics*. 2014;15(5):390-399. doi:10.2174/1389202915666140716175634
- Ogeng'o JA, Gatonga PM, Olabu BO, Nyamweya DK, Ong'era D. Pattern of congestive heart failure in a Kenyan paediatric population. *Cardiovasc J Afr*. 2013;24(4):117-120. doi:10.5830/cvja-2013-015
- Zheleva B, Atwood JB. The invisible child: childhood heart disease in global health. *Lancet*. 2017;389(10064):16-18. doi:10.1016/s0140-6736(16)32185-7
- van der Bom T, Zomer AC, Zwinderman AH, Meijboom FJ, Bouma BJ, Mulder BJM. The changing epidemiology of congenital heart disease. *Nat Rev Cardiol*. 2011;8(1):50-60. doi:10.1038/nrcardio.2010.166
- Liu Y, Chen S, Zühlke L, et al. Global birth prevalence of congenital heart defects 1970-2017: updated systematic review and meta-analysis of 260 studies. *Int J Epidemiol*. 2019;48(2):455-463. doi:10.1093/ije/dyz009
- Mandalenakis Z, Giang KW, Eriksson P, et al. Survival in children with congenital heart disease: have we reached a peak at 97%. *J Am Heart Assoc*. 2020;9(22):e017704. doi:10.1161/jaha.120.017704
- Siabani S. Epidemiology of congenital heart defects in Iran: a systematic review. *Online J Cardiol Res Rep*. 2019;2(3):1-5. doi:10.33552/OJCRR.2019.02.000537
- Lancellotti P, Tribouilloy C, Hagendorff A, et al. Recommendations for the echocardiographic assessment of native valvular regurgitation: an executive summary from the European Association of Cardiovascular Imaging. *Eur Heart J Cardiovasc Imaging*. 2013;14(7):611-644. doi:10.1093/ehjci/jet105
- Bhat NK, Dhar M, Kumar R, Patel A, Rawat A, Kalra BP. Prevalence and pattern of congenital heart disease in Uttarakhand, India. *Indian J Pediatr*. 2013;80(4):281-285. doi:10.1007/s12098-012-0738-4
- Mohsenzadeh a, saket s, Ahmadipour s, Baharvand b. prevalence and types of congenital heart disease in babies born in the city of Khorramabad (2007-2011). *scientific magazine yafte*. 2014;15(5):23-29.
- Nikyar B, Sedehi M, Mirfazeli A, Qorbani M, Golalipour MJ. Prevalence and pattern of congenital heart disease among neonates in Gorgan, Northern Iran (2007-2008). *Iran J Ped*. 2011;21(3):307-312.
- Rahim F, Ebadi A, Saki G, Remazani A. Prevalence of congenital heart disease in Iran: a clinical study. *J Med Sci*. 2008;8:547-552. doi:10.3923/jms.2008.547.552
- Pan F, Li J, Lou H, et al. Geographical and socioeconomic factors influence the birth prevalence of congenital heart disease: a