



## The Epidemiology of Cardiovascular Mortality in Pediatric Patients: Letter to Editor

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Cardiovascular Disease (CVD) is a leading cause of early childhood death and disability worldwide (1). Iran has a potentially larger incidence of premature deaths, especially cardiac deaths, due to cultural factors (e.g., consanguineous marriages), environmental factors (e.g., hazardous biochemical materials abused during and after the imposed war), and sociodemographic status (2). Analyzing detailed information about child-mortality is crucial for health policymakers, health caregivers, and researchers in order to estimate the burden of diseases, prioritize funding, and design interventional activities to improve child survival. The current study aims to explore the prevalence of cardiovascular death as well as its predicting factors among patients  $\leq 18$  years old admitted to Imam Reza Hospital (IRH) from 2011 to 2016.

In this retrospective, descriptive-analytical study, all cardiac deaths that were registered in IRH from April 2011 to March 2016 and met the inclusion criteria (aging  $\leq 18$  years and having adequate information) were explored for data related to the study objectives. The cases were excluded from the study if they had died before getting medical services in IRH and/or they lacked complete personal or medical information.

Using an open-ended questionnaire, the data were collected by two nurses who were well trained regarding

patient entry and data gathering. Information about demographic characteristics (e.g., sex), medical history (e.g., comorbidity), admitted ward, insurance, and type of cardiac death was collected. The questionnaire was approved by a group of experts, including a statistician, an internal specialist, and a PhD in public health.

Data analysis was performed using the SPSS statistical software (version 23.0; IBM Corporation, Chicago, USA). Qualitative/categorical variables were expressed as frequencies and percentages. Chi-square test was used to assess the relationships between the outcome and the predicting variables. A p-value of less than 0.05 was considered to be statistically significant.

Totally, 1113 deaths were recorded between 2011 and 2016, with cardiac deaths comprising 7.9% of the cases ( $n = 88$ ). Most of the deaths (50.0%) were related to neonates and nearly 51.1% of the cases were male. Thus, the current study findings showed a significant number of neonatal mortalities, which is in accordance with the results of some studies conducted in Iran and other countries. For instance, Black et al. (3) and Sadeghieh Ahari et al. (4) reported that child mortality mostly occurred in the neonatal period. In fact, child mortality is shifting closer and closer to the time of birth worldwide. Therefore, paying attention to neonatal care is recommended.

**Table 1.** Baseline Characteristics of the Children Died due to Cardiovascular Causes (n = 88)

Characteristics	Subgroup	N (%)
Age	Neonate (< 1 month)	44 (50.0)
	Infant (< 12 months)	13 (14.8)
	Toddler and pre-school (1 - 5 years)	11 (12.5)
	School age (6 - 12 years)	9 (10.2)
	Teenager (13 - 18 years)	11 (12.5)
Gender	Male	45 (51.1)
	Female	43 (48.9)
Health insurance	Yes	73 (83.0)
Comorbidity	Yes	81 (92.0)
Admitted ward	Neonatal ICU	44 (50.0)
	Pediatric ICU	37 (41.0)
	Pediatric ward	5 (5.7)
	Operating room	2 (2.2)
Cause of death	CHD	26 (29.5)
	Heart failure	17 (19.3)
	Cerebral/intracranial hemorrhage	11 (15.9)
	Cardiac arrest / arrhythmias	9 (10.2)
	Bradycardia	6 (6.8)
	Pulmonary embolism	7 (7.9)
	Subdural hematoma	3 (3.4)

Abbreviations: N, number; ICU, intensive care unit; CHD, congenital heart disease

In the current study, almost 92.0% of the cases had been suffering from at least one comorbidity (dominancy of preterm and Congenital Heart Disease (CHD)). The findings also indicated that about half of the cases had a history of prematurity, which is a significant contributor to long-term adverse health outcomes. Moreover, the most frequently occupied hospital wards were neonatal ICU (50.0%) and pediatric ICU (41.0%). Furthermore, about 83.0% of the cases had been covered by health insurance (Table 1).

The study results demonstrated that the most frequent cardiac causes of in-hospital child mortality were CHD (29.0%), heart failure (19.0%), and cerebral/intracranial hemorrhage (16.0%). Similar results were also obtained by Vetter et al. (5). The results revealed no significant relationships between the causes of death and gender ( $P = 0.24$ ) and comorbidity ( $P = 0.35$ ). Nonetheless, age was significantly associated with the causes of death ( $P = 0.001$ ). Accordingly, death due to CHD was more common among neonates.

Enlisting cardiovascular diseases on the top of mortality causes was predictable. However, evidence has indicated that the majority of deaths are preventable through reducing the cardiovascular risk factors and increasing the living standards and socioeconomic facilities. Likewise, improving neonatal care and increasing prenatal and antenatal care are recommended to prevent neonatal mortality.

The most important limitation of the current study was the poor documentation in the recorded medical information. To counter this limitation, the data were collected using both paper and electronic medical records. Furthermore, lack of patients' detailed information made it difficult to assess the factors associated with the causes of deaths.

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#### Authors' Contribution

All authors have, fully or partly, been involved in the concepts and design of the study, collecting the data or preparing the manuscript. In addition all have reviewed the manuscript. S Siabani developed the original idea, the protocol, and study design. M Babakhani collected and manage the data. M Babakhani and S Siabani participated in data analyses and writing manuscript. All authors provided comments and approved the final manuscript.

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#### References

- Gidding SS. Epidemiology of Cardiovascular Disease in Children. *Pediatric Hypertension*. 2017;1-14.
- van der Linde D, Konings EE, Slager MA, Witsenburg M, Helbing WA, Takkenberg JJ, et al. Birth prevalence of congenital heart disease worldwide: a systematic review and meta-analysis. *J Am Coll Cardiol*. 2011;58(21):2241-7.
- Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000-13, with projections to inform post-2015 priorities: an updated systematic analysis. *Lancet*. 2015;385(9966):430-40.
- Barak M, Sadeghieh Ahari S, Amani F, Asadi G, Rahimi G, Khadem E. Causatives and Risk Factors for Deaths among Infants Under 1 Year Old in Ardabil Slums during 2008-2009. *Journal of Ardabil University of Medical Sciences*. 2012;12(5):40-7.
- Vetter VL, Covington TM, Dugan NP, Haley DM, Dykstra H, Overpeck M, et al. Cardiovascular deaths in children: general overview from the National Center for the Review and Prevention of Child Deaths. *Am Heart J*. 2015;169(3):426-37 e23.