



CODEN [USA]: IAJPBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

<http://doi.org/10.5281/zenodo.3901178>

Available online at: <http://www.iajps.com>

Research Article

RISK FACTORS AND INCIDENCE RATE OF MORTALITY AFTER SURGICAL INTERVENTION BECAUSE OF CONGENITAL HEART COMPLICATIONS

¹Dr. Atif Kamal, ²Dr Aisha Saleem, ³Dr Muhammad Nouman Butt

¹Khyber Teaching Hospital, Peshawar

²DHQ Teaching Hospital Sahiwal

³Medical Officer, Aziz Bhatti Shaheed Hospital, Gujrat

Article Received: April 2020

Accepted: May 2020

Published: June 2020

Abstract:

Objective: The most vital factor to determine the quality of the heart surgeries because of congenital heart diseases is the rate of mortality after these surgical interventions. There is no research work to assess the rate of mortality because of these surgeries in our country, Pakistan. This research work aimed to find out the risk factors and incidence rate of mortality after surgical intervention for healing these congenital heart diseases.

Methodology: In this retrograde research work, we evaluated one hundred and twenty children who died after cardiac operations and also one hundred and fifty children who recovered after these surgeries from 2015 to 2019. We also analyzed the social and personal parameters as well as the risk factors of these mortalities. SPSS V. 20 was in use for the statistical analysis of the collected information.

Results: The findings of this research work showed that 12.640% children met their death after surgical intervention. Most important risk factors of mortality were age of patient, body weight, body surface, height, BUN (Blood Urea Nitrogen) before surgery, PTT ((Prothrombin Time) before surgical intervention, cyanosis before operation and bleeding after surgery.

Conclusion: The findings of this research work conclude that rate of mortality of the children suffering from congenital heart diseases after surgical intervention is very high. There are very few research work available about this field in our country Pakistan. There is need of more research studies to reach a valid conclusion to prevent such occurrence of high mortality rate.

KEY WORDS: Occurrence, mortality, prevalence, incidence, surgery, PTT, BUN, risk factors, intervention.

Corresponding author:

Dr. Atif Kamal,

Khyber Teaching Hospital, Peshawar

QR code



Please cite this article in press Atif Kamal et al., *Risk Factors And Incidence Rate Of Mortality After Surgical Intervention Because Of Congenital Heart Complications* ., Indo Am. J. P. Sci, 2020; 07(06).

INTRODUCTION:

Different research work has shown that the prevalence of congenital heart anomalies are very high among infants [1]. CHD is the most important reason of death in the children having less than ten years of age [2]. There are many factors involved behind these complications as various environmental and genetic reasons are the main responsible in the pathogenesis of these complications. A wide range of cardiac anomalies are included in the CHD but there are four main groups;

- a CHD without cyanosis & high pulmonary pressure in arteries,
- b CHD with high pulmonary pressure of arteries but without cyanosis
- c CHD without high pulmonary pressure of arteries and with cyanosis
- d CHD with high pressure of pulmonary arteries and with cyanosis.

The most common complications of the CHD are the abnormalities of the wall of ventricular with a rate of prevalence of 30.0% [3]. There are 3 important ways to treat the congenital heart complications. 1st is simple medical treatment of simple patients, 2nd treatment method involves catheterization and interventions. 3rd way is the surgical intervention in the patients with disorders those gave no response to first 2 treatment methods [4, 5]. Repair through surgical intervention is the best method of treatment for congenital heart complications but it has a large number of associated complications. Major complications include mortality after or during surgical intervention, complications of CNS, restriction in activity, impact on pregnancy, requirement of utilization of drugs for very long time and reduction in the QoL [6]. Regardless of these complication, there is a trend of an increase in these surgeries. Grech reported same results in his research work conducted in 1998 in USA [7]. In current days, there are developments in the surgical methods and surgeries for CHD are even being performed for fetus developing in the uterus [8]. The rate of mortality after cardiac repair for CHD is 4.0% to 5.0%. Most important feature to know about the quality of surgery is the rate of mortality after surgical intervention [9, 10]. Research studies conducted from 1980 to 1999 stated that rate of mortality after operation for CHD decreased because of the development in medical care facilities [11].

Gills in his research work conducted in 2004 stated that ideal marker for quality of operation for CHD is one-year rate of survival after surgical intervention [12].

Various research works assessed risk factors accountable for mortality in cardiac repair for CHD. One research work stated that the rate of mortality in female patients is high as compared to male patients [13]. Another research work showed that there is direct association of the rate of mortality with the surgical procedures [14]. Boneva in his research work conducted in 2008, determined the rate of mortality among pediatrics who were undergoing cardiac repair for CHDs from 1979 to 1997. He concluded that there was a gradual increase in the rate of mortality after cardiac repair for CHDs [11]. The rationale of this research work was to find out the risk factors of CHDs and rate of mortality because of these complications after cardiac repair for CHDs.

METHODOLOGY:

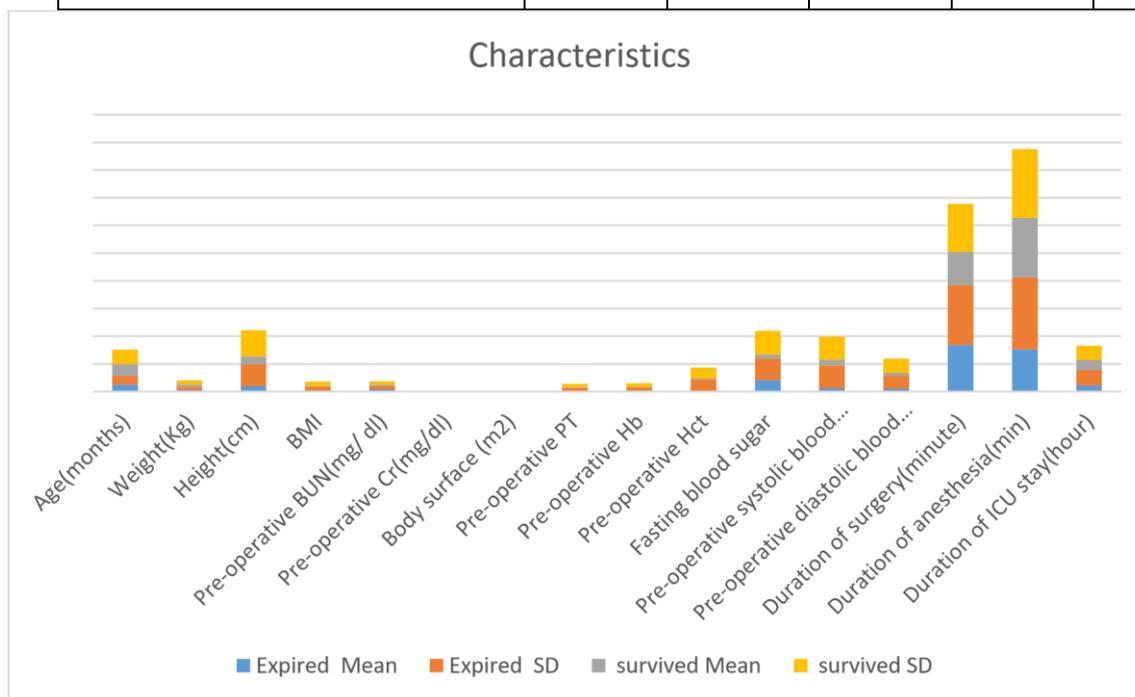
Ethical committee of the General Hospital, Lahore gave the permission to conduct this research work. Total one hundred and twenty patients who underwent cardiac repair for congenital heart anomalies and died were the participants of this research work from 2015 to 2019. We also randomly selected one hundred and fifty patients who survived after cardiac repair to determine the risk factors of mortality. All the children having less than fifteen years of age who underwent cardiac repair for congenital heart diseases from 2015 to 2019 in Cardiology Department were only the participants of this research study. The patients undergoing some other surgeries in addition with cardiac repair were not included in this research work. We recorded the data about the characteristics of demography as age, gender, CHD type, duration of surgery, time of anesthesia, intubation time after surgery, and stay duration in ICU of every patient. SPSS V.20 was in use for the statistical analysis of the collected information. Chi square test was in use for the analysis of independent variables. We expressed all the data in averages and standard deviations.

RESULTS:

Overall perioperative rate of mortality among children who were undergoing cardiac surgery for congenital heart complications was 12.640%. Characteristic of the collected data and probable factors of risk for this mortality rate for the cardiac repair of congenital heart complications are present in Table-1 and Table-2.

Table-I: Characteristic of two groups of patients and risk factors for mortality

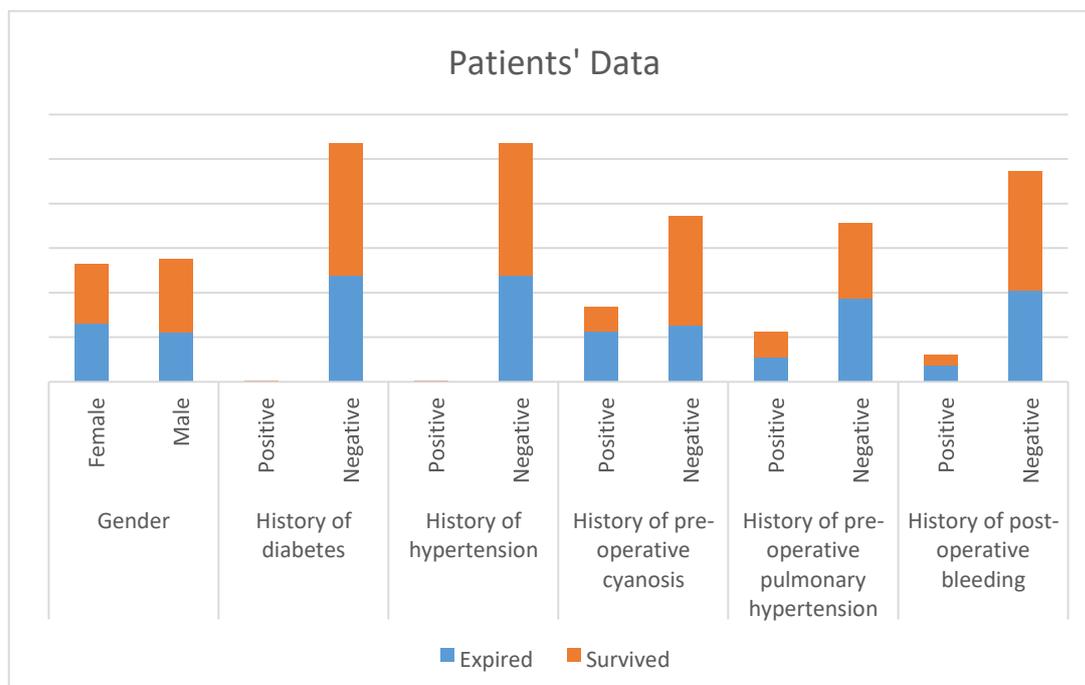
Characteristics	Expired		survived		P value
	Mean	SD	Mean	SD	
Age(months)	25.420	31.680	42.750	51.740	0.0010
Weight(Kg)	5.850	10.040	10.270	14.870	0.0010
Height(cm)	19.850	79.330	27.510	95.520	0.0010
BMI	3.660	15.080	2.710	14.970	0.7900
Pre-operative BUN(mg/ dl)	7.750	13.660	4.290	11.710	0.0090
Pre-operative Cr(mg/dl)	0.200	0.490	1.000	0.620	0.1600
Body surface (m ²)	0.060	0.290	0.300	0.780	0.0010
Pre-operative PT	1.590	12.350	1.540	12.820	0.0300
Pre-operative Hb	1.130	13.970	1.150	13.930	0.7300
Pre-operative Hct	3.640	39.980	3.690	39.970	0.7300
Fasting blood sugar	41.680	79.150	13.640	85.250	0.0900
Pre-operative systolic blood pressure	12.670	82.650	20.320	82.720	0.9700
Pre-operative diastolic blood pressure	10.510	46.270	11.880	50.910	0.0010
Duration of surgery(minute)	168.760	215.650	120.500	173.450	0.0100
Duration of anesthesia(min)	152.460	259.840	214.640	248.070	0.6100
Duration of ICU stay(hour)	22.510	54.550	37.650	51.000	0.2300



The findings stated that among one hundred and twenty deceased patients, fifty six children died in ICU and sixty four patients died in the operation theater. Cardiogenic shock was the reason of death in fifty six patients, arrhythmia in forty five patients, acute tubular necrosis in only ten patients and pulmonary edema & ARDS were the main reasons of death among nine patients.

Table-II: Patients' data in two groups

Patients Data		Expired	Survived	P value
Gender	Female	65.0	67.0	0.0700
	Male	55.0	83.0	
History of diabetes	Positive	0.0	1.0	0.4400
	Negative	120.0	148.0	
History of hypertension	Positive	0.0	1.0	0.4400
	Negative	120.0	148.0	
History of pre-operative cyanosis	Positive	57.0	27.0	0.0010
	Negative	63.0	123.0	
History of pre-operative pulmonary hypertension	Positive	27.0	29.0	0.0080
	Negative	93.0	85.0	
History of post-operative bleeding	Positive	18.0	12.0	0.0010
	Negative	102.0	134.0	

**DISCUSSION:**

The findings showed that from more than fifteen hundred cardiac surgeries performed among pediatric patients with CHDs, one hundred and twenty deaths occurred (12.640%). A research work conducted in Benavidez in USA in year of 2007 displayed that from 10032 patients who underwent surgery for repair of CHDs in a heart center, 4.0% (n: 416) patients died [2]. This rate of mortality is much less than the rate of mortality observed in this research work. Gibbs stated that rate of mortality of 3666 cardiac surgeries for CHDs in UK between 2001 and 2002 has been approximately 12.78% which is much near to our findings [12]. A research work which was carried out in 2004 in UK showed that cardiac repair after CHD was 15.0% that was much high average rate of mortality of this research work [1]. In one other research work conducted in 2008 in USA, Welke concluded that from 16,807

cardiac repairs for congenital heart anomalies, rate of mortality was 2.90% [15]. The rate of mortality is much high in this research work because our country is a developing country.

Findings of this current research work stated that age of the patient, body weight, body surface and height were not much involved as compared to the survived patients. The age of all the deceased patients was much less. We know that cardiac surgeries in initial ages has severe issues, hence the rate of mortality will be higher, and this finding is consistent with the results of research work of Welke [15]. Findings of one other research work performed in UK concluded that danger of death is very high for the patients having less than one year of age as compared to the patients having greater than one year of age [16]. Findings of one other study concluded that there was high risk of death after open surgery of heart among

children having less than thirty days of age [2]. Findings of this research work confirmed the research works of the past which stated that there are some factors which can increase the possibility of the death among pediatrics after open surgery of heart after surgical intervention for repair of congenital heart abnormalities.

CONCLUSION:

The results of this research work conclude that age of the patient, body weight, PTT, height, body surface and total surgery duration are the important risk factors among children suffering from congenital heart complications undergoing surgeries. The main limitation of this research work was small sample size. There is need of more research works on larger sample size to consolidate the findings of this research work.

REFERENCES:

- Buckley, Jason R., Venu Amula, Peter Sassalos, John M. Costello, Arthur J. Smerling, Ilias Iliopoulos, Aimee Jennings et al. "Multicenter analysis of early childhood outcomes after repair of truncus arteriosus." *The Annals of Thoracic Surgery* 107, no. 2 (2019): 553-559.
- Zimmerman, Meghan S., Alison Grace Carswell Smith, Craig A. Sable, Michelle Marie Echko, Lauren B. Wilner, Helen Elizabeth Olsen, Hagos Tasew Atalay et al. "Global, regional, and national burden of congenital heart disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017." *The Lancet Child & Adolescent Health* 4, no. 3 (2020): 185-200.
- Gorantla, Siddharth C., Titus Chan, Irving Shen, Jacob Wilkes, and Susan L. Bratton. "Current epidemiology of vocal cord dysfunction after congenital heart surgery in young infants." *Pediatric Critical Care Medicine* 20, no. 9 (2019): 817-825.
- Setton, Matan, Wei He, and Oscar J. Benavidez. "Morbidity During Adult Congenital Heart Surgery Admissions." *Pediatric cardiology* 40, no. 5 (2019): 987-993.
- Brown, Katherine L., Deborah Ridout, Christina Pagel, Jo Wray, David Anderson, David J. Barron, Jane Cassidy et al. "Incidence and risk factors for important early morbidities associated with pediatric cardiac surgery in a UK population." *The Journal of thoracic and cardiovascular surgery* 158, no. 4 (2019): 1185-1196.
- Ombelet, Fouke, Eva Goossens, Silke Apers, Werner Budts, Marc Gewillig, and Philip Moons. "Predicting 15-year mortality in adults with congenital heart disease using disease severity and functional indices." *Canadian Journal of Cardiology* 35, no. 7 (2019): 907-913.
- Vincenti, Marie, Sophie Guillaumont, Beatrice Clarivet, Valerie Macioce, Thibault Mura, Pierre Boulot, Gilles Cambonie, and Pascal Amedro. "Prognosis of severe congenital heart diseases: Do we overestimate the impact of prenatal diagnosis?." *Archives of cardiovascular diseases* 112, no. 4 (2019): 261-269.
- Vehmeijer, J. T., Z. Koyak, A. H. Zwinderman, L. Harris, R. Peinado, E. N. Oechslin, C. K. Silversides et al. "PREVENTION-ACHD: PROspEctiVE study on implaNTable cardioverter-defibrillator therapy and suddeN cardiac death in Adults with Congenital Heart Disease; Rationale and Design." *Netherlands Heart Journal* 27, no. 10 (2019): 474-479.
- Parker, Devin M., Allen D. Everett, Meagan E. Stabler, JoAnna Leyenaar, Luca Vricella, Jeffrey P. Jacobs, Heather Thiessen-Philbrook, Chirag Parikh, Jason Greenberg, and Jeremiah R. Brown PhD. "The Association Between Cardiac Biomarker NT-proBNP and 30-Day Readmission or Mortality After Pediatric Congenital Heart Surgery." *World Journal for Pediatric and Congenital Heart Surgery* 10, no. 4 (2019): 446-453.
- Ivan, B. Ye, Steven J. Girdler, Zoe B. Cheung, Samuel J. White, William A. Ranson, and Samuel KangWook Cho. "Risk Factors Associated with 30-Day Mortality After Open Reduction and Internal Fixation of Vertebral Fractures." *World neurosurgery* 125 (2019): e1069-e1073.
- Du, Jerry Y., Adam J. Schell, Chang-yeon Kim, Nikunj N. Trivedi, Uri M. Ahn, and Nicholas U. Ahn. "30day mortality following surgery for spinal epidural abscess: incidence, risk factors, predictive algorithm, and associated complications." *Spine* 44, no. 8 (2019): E500-E509.
- Upadhyay, Jyoti, Nidhi Tiwari, Mahendra Rana, Amita Rana, Sumit Durgapal, and Satpal Singh Bisht. "Pathophysiology, etiology, and recent advancement in the treatment of congenital heart disease." *Journal of Indian College of Cardiology* 9, no. 2 (2019): 67.
- Spitzer, Allison B., K. Aaron Shaw, Michael Schmitz, Dennis P. Devito, and Joshua S. Murphy. "Perioperative Complications After Spinal Fusion in Pediatric Patients With Congenital Heart Disease." *Spine deformity* 7, no. 1 (2019): 158-162.
- Parker, Devin M., Allen D. Everett, Meagan E. Stabler, Luca Vricella, Marshall L. Jacobs, Jeffrey P. Jacobs, Chirag R. Parikh, Sara K. Pasquali, and Jeremiah R. Brown. "Novel

- Biomarkers Improve Prediction of 365-Day Readmission After Pediatric Congenital Heart Surgery." *The Annals of thoracic surgery* 109, no. 1 (2020): 164-170.
15. Wang, Tingting, Lizhang Chen, Tubao Yang, Peng Huang, Lesan Wang, Lijuan Zhao, Senmao Zhang et al. "Congenital Heart Disease and Risk of Cardiovascular Disease: A Meta-Analysis of Cohort Studies." *Journal of the American Heart Association* 8, no. 10 (2019): e012030.
 16. Van Calster, Katrien, Aurélie Bianchini, Fadi Elias, Adrien Hertault, Richard Azzaoui, Dominique Fabre, Jonathan Sobocinski, and Stéphan Haulon. "Risk factors for early and late mortality after fenestrated and branched endovascular repair of complex aneurysms." *Journal of vascular surgery* 69, no. 5 (2019): 1342-1355.