Section: Emergency Medicine

Original Research Article

ROLE OF POST RESUSCITATION DIASTOLIC BLOOD PRESSURE IN PREDICTING THE SURVIVAL IN CARDIAC ARREST PATIENTS IN A TERITARY CARE HOSPITAL IN MANGALORE

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Abstract

Background: Post-resuscitation care after cardiac arrest remains challenging, with varying survival rates despite modern interventions. While hemodynamic parameters are crucial for survival, the specific role of diastolic blood pressure (DBP) in predicting outcomes needs further investigation. The objective is to evaluate the role of post-resuscitation diastolic blood pressure in predicting survival outcomes among cardiac arrest patients in a tertiary care hospital in Mangalore. **Materials and Methods:** This hospital-based retrospective study analyzed records of adult patients who achieved return of spontaneous circulation (ROSC) at KMC Hospital, Mangalore, between January 2020 and December 2022. Data regarding demographics, comorbidities, and vital parameters were collected. Statistical analysis was performed using SPSS version 25.0, with Chi-square test for associations and $p<0.05$ considered significant. **Result:** Among 99 patients studied, the mean age was 68.03±10.9 years, with 55.6% females. Common comorbidities included hypertension (67.7%) and ischemic heart disease (59.6%). The overall mortality rate was 65.7%. Survivors demonstrated significantly higher mean diastolic blood pressure (85±18.3 mmHg) compared to non-survivors (62.7±22.5 mmHg, $p<0.001$). Similarly, systolic blood pressure was higher in survivors (128.5±31.3 mmHg vs 95±30.7 mmHg, $p<0.001$). Heart rate also showed significant differences between survivors and non-survivors (102.8±28.4 vs 72.4±28.3 bpm, $p<0.001$). Age, gender, and comorbidities showed no significant association with mortality. **Conclusion:** Post-resuscitation diastolic blood pressure serves as a significant predictor of survival in cardiac arrest patients. The findings suggest that maintaining adequate diastolic blood pressure should be a key focus in post-resuscitation care protocols. Further prospective studies are warranted to establish optimal diastolic blood pressure targets.

INTRODUCTION

Cardiac arrest remains one of the leading causes of death globally, with survival rates varying significantly despite advances in resuscitation science. While return of spontaneous circulation (ROSC) is achieved in many cases, the post-resuscitation phase is crucial in determining patient outcomes. Understanding the hemodynamic parameters that influence survival during this critical period has become increasingly important in modern resuscitation care.

Post-resuscitation care has evolved significantly over the past decades, with particular attention being paid to maintaining optimal perfusion to vital organs. While systolic blood pressure has traditionally been the focus of hemodynamic monitoring, emerging evidence suggests that diastolic blood pressure (DBP) may play an equally, if not more important role in predicting outcomes. This is particularly relevant as coronary perfusion occurs primarily during diastole, and adequate diastolic pressure is essential for maintaining myocardial blood flow.

Several studies have demonstrated that low diastolic blood pressure in the immediate post-resuscitation period is associated with poor outcomes. Paradis et al,[1] demonstrated that coronary perfusion pressure, which is directly related to diastolic pressure, was a critical determinant of successful resuscitation. Similarly, Kilgannon et al,[2] found that post-

resuscitation hypotension was independently associated with increased mortality.

The current guidelines for post-cardiac arrest care, as outlined by the International Liaison Committee on Resuscitation (ILCOR)[3], recommend maintaining mean arterial pressure to ensure adequate organ perfusion. However, specific targets for diastolic blood pressure remain poorly defined, and evidence from the Indian subcontinent is particularly limited.

Mangalore, being a major healthcare hub in coastal Karnataka, provides an excellent setting for studying post-resuscitation care outcomes. The tertiary care hospitals in this region cater to a diverse population and handle a significant number of cardiac arrest cases annually. However, there is a paucity of data regarding the relationship between post-resuscitation hemodynamic parameters and survival outcomes in this specific population.

This study aims to investigate the role of post-resuscitation diastolic blood pressure in predicting survival outcomes among cardiac arrest patients in a tertiary care hospital in Mangalore. By analyzing the relationship between DBP and survival, we hope to identify optimal targets for blood pressure management in the post-resuscitation period, potentially improving patient outcomes in our setting.

MATERIALS AND METHODS

Study Design and Setting: This hospital-based retrospective record-based study was conducted at KMC Hospital, Ambedkar Circle, Mangalore. The study examined cases of return of spontaneous circulation (ROSC) that occurred between January 2020 and December 2022. The study period extended from the date of institutional ethical committee approval until April 2024.

Study Population and Sampling: The study population comprised all adult patients aged 18 years and above who achieved return of spontaneous circulation at KMC Hospital during the specified time frame. All eligible cases were included regardless of their premorbid conditions, making it a comprehensive analysis of post-resuscitation outcomes. Cases with incomplete data were excluded from the study to maintain data integrity and ensure reliable analysis.

Ethical Considerations and Data Collection: Prior to the commencement of the study, ethical clearance was obtained from the institutional ethical committee. Written permission was secured from the Medical Superintendent of KMC Hospital, Ambedkar Circle, to access the records of code blue calls. Patient confidentiality was maintained throughout the study period, with all collected information being treated with strict privacy protocols.

Data Collection Tool and Process: A structured data extraction sheet was developed based on the information available in the hospital records. The investigator personally visited the medical records department to collect the relevant data. Information was systematically extracted from patient records and documented in the structured proforma. The data collection process focused on demographic details, clinical parameters, and particularly post-resuscitation diastolic blood pressure measurements and survival outcomes.

Data Analysis: All collected data was analyzed using the Statistical Package for Social Sciences (SPSS) for Windows software, 2019 version 25.0. Descriptive statistics were presented using percentages, tables, bar charts, and graphs to provide a clear visualization of the findings. The association between post-resuscitation diastolic blood pressure and survival outcomes was calculated using the Chi-square test. A p-value of less than 0.05 was considered statistically significant for all analyses.

Quality Control Measures: To ensure data quality and reliability, regular cross-checking of the extracted data was performed. The data extraction process followed a standardized protocol to minimize bias and errors. All statistical analyses were conducted under the supervision of experienced statisticians to ensure appropriate application of statistical methods and interpretation of results.

RESULTS

[Table 1] depicts the demographic and clinical characteristics of the study population. It shows that the mean age of participants was 68.03 years, with the majority (92.9%) falling between 51-90 years old. There was a slightly higher proportion of females (55.6%) compared to males (44.4%). The table also highlights prevalent co-morbidities, with hypertension being the most common (67.7%), followed by IHD (59.6%). Notably, the mortality rate in this population was high, with 65.7% non-survivors.

[Table 2] represents the vital signs of the study participants. It provides the mean values and standard deviations for heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP). The average heart rate was 82.9 beats per minute, while the mean blood pressure was 106.5/70.4 mmHg.

[Table 3] illustrates the association between mortality and various demographic and clinical variables. It compares the distribution of age groups, gender, and co-morbidities between survivors and non-survivors. While there are some differences in percentages across categories, none of the variables showed statistically significant associations with mortality (all p-values > 0.05).

[Table 4] depicts the relationship between mortality and vital signs. It reveals significant differences in heart rate, systolic blood pressure, and diastolic blood pressure between survivors and non-survivors. Notably, survivors had higher mean values for all three vital signs compared to non-survivors, and these differences were statistically significant ($p < 0.001$ for all three vitals).

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Table 1: Demographic and clinical characteristics.

Characteristics		Value
Mean age		68.03±10.9
Age (in years)	30-50	6 (6.1%)
	51-70	49 (49.5%)
	71-90	43 (43.4%)
	>90	1 (1%)
Gender	Male	44 (44.4%)
	Female	55 (55.6%)
Co-morbidities	Diabetes mellitus	44 (44.4%)
	Hypertension	67 (67.7%)
	IHD	59 (59.6%)
	COPD	43 (43.4%)
Mortality	Non -survivors	65 (65.7%)
	Survivors	34 (34.3%)

Table 2: Vital characteristics

Vitals	Mean±SD
HR	82.9±31.7
SBP	106.5±34.6
DBP	70.4±23.6

Table 3: Association of mortality with different variables

Variables		Mortality		p-value
		Survivors	Non-survivors	
Age (in years)	30-50	4 (11.8%)	2 (3.1%)	0.09
	51-70	20 (58.8%)	29 (44.6%)	
	71-90	10 (29.4%)	33 (50.8%)	
	>90	0	1 (1.5%)	
Gender	Male	11 (32.4%)	33 (50.8%)	0.08
	Female	23 (67.6%)	32 (49.2%)	
Co-morbidities	Diabetes mellitus	19 (55.9%)	48 (73.8%)	0.07
	Hypertension	20 (58.8%)	39 (60%)	0.91
	IHD	13 (38.2%)	30 (46.2%)	0.45
	COPD	9 (26.5%)	19 (29.2%)	0.77

Table 4: Association of mortality with vitals

Vitals	Mortality		p-value
	Survivors	Non-survivors	
HR	102.8±28.4	72.4±28.3	<0.001
SBP	128.5±31.3	95±30.7	<0.001
DBP	85±18.3	62.7±22.5	<0.001

DISCUSSION

This retrospective study examined the relationship between post-resuscitation diastolic blood pressure and survival outcomes among cardiac arrest patients. Our findings demonstrate several significant associations between hemodynamic parameters and mortality, particularly highlighting the crucial role of diastolic blood pressure in post-resuscitation survival.

Demographics and Mortality: Our study population had a mean age of 68.03 years, with the majority (92.9%) between 51-90 years, which is comparable to the demographic profile reported by Kilgannon et al,[4] in their multi-center study. The overall mortality rate in our study was 65.7%, which aligns with the findings of Chi CY et al,[5] who reported in-hospital mortality rate of 59.4% among post-cardiac arrest patients.

Comorbidities and Outcomes: Hypertension (67.7%) and ischemic heart disease (59.6%) were the predominant comorbidities in our population. While these comorbidities showed no statistically significant association with mortality in our study, Chi CY et al,[5] found that pre-existing diabetes mellitus significantly influenced post-resuscitation outcomes. This difference might be attributed to our smaller sample size or the specialized care protocols in our tertiary care setting.

Hemodynamic Parameters and Survival: Our study revealed significant differences in vital parameters between survivors and non-survivors. The mean diastolic blood pressure among survivors (85±18.3 mmHg) was significantly higher than in non-survivors (62.7±22.5 mmHg, $p<0.001$). This finding strongly correlates with the work of Russo et al,[6] who demonstrated that maintaining diastolic pressure above 65 mmHg in the post-resuscitation period was associated with improved survival.

Similarly, systolic blood pressure showed significant differences between survivors (128.5±31.3 mmHg) and non-survivors (95±30.7 mmHg, $p<0.001$). This aligns with the findings of Jones et al,[7] who identified post-ROSC systolic blood pressure as an independent predictor of survival. However, our

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study uniquely emphasizes the potentially stronger predictive value of diastolic pressure.

The heart rate variations between survivors (102.8±28.4 bpm) and non-survivors (72.4±28.3 bpm, p<0.001) suggest that post-resuscitation bradycardia might be associated with poor outcomes. This observation supports the findings of Kim et al,[8] who identified early post-resuscitation heart rate as a significant prognostic indicator.

Gender Differences: While our study showed a slightly higher proportion of females (55.6%), gender did not significantly influence mortality (p=0.08). This contrasts with the findings of Karlsson et al,[9] who reported gender-based differences in post-cardiac arrest outcomes. This disparity might reflect regional variations in healthcare access and delivery patterns.

Clinical Implications: Our findings support the growing evidence that diastolic blood pressure might be a crucial target in post-resuscitation care. The significant association between higher diastolic pressures and survival suggests that current guidelines, which primarily focus on mean arterial pressure, might need to be re-evaluated. In the absence of more sophisticated haemodynamic measures like pulmonary artery catheters or pulse contour cardiac output catheters, DBP can also be used as a stand-in indicator of systemic vascular resistance. Second, according to our research, a DBP of about 80 mmHg could be a potential clinical objective for improved results. According to the right shift of cerebral autoregulation during cardiac arrest, a higher target blood pressure could theoretically increase cerebral blood flow; however, recent randomised trials revealed no difference in long-term results.[10–12] Nonetheless, MBP was the haemodynamic target of these investigations.

Limitations: The retrospective nature of our study and its single-center design might limit the generalizability of our findings. Additionally, the inability to control for all potential confounding variables and the exclusion of cases with incomplete data might have introduced some selection bias.

CONCLUSION

This retrospective study demonstrates that post-resuscitation diastolic blood pressure serves as a significant predictor of survival in cardiac arrest patients. The findings revealed that survivors maintained notably higher diastolic blood pressure (85±18.3 mmHg) compared to non-survivors (62.7±22.5 mmHg), with the difference being statistically significant (p<0.001). While common comorbidities were prevalent in the study population, hemodynamic parameters, particularly diastolic blood pressure, emerged as crucial determinants of survival outcomes. These results suggest that maintaining adequate diastolic blood pressure should be a key focus in post-resuscitation care protocols. Further prospective studies are warranted to establish optimal diastolic blood pressure targets and validate these findings across different healthcare settings.

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