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Relationship between Blood Pressure Fluctuations and Cardiac Arrest Outcomes in Patients with Pre-Existing Hypertension

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Abstract: The effects of both increased blood pressure and blood pressure variability have significantly affected the survival and neurological outcome of out-of-hospital cardiac arrest (OHCA) patients. Our study presented a cross-sectional to evaluate and analysis outcomes of blood pressure fluctuations' effect on patients with hypertension in pre and post-cardiac arrest. A cross-sectional study involving one hundred and five hypertensive patients who are comprised of both sexes and aged between thirty-eight and seventy years diagnosed with various hospitals scattered all different hospitals in Iraq was performed from January 2023 to January 2024. Blood pressure measurements such as systolic and diastolic blood pressure taken prior to cardiac arrest activity at admission and after resuscitation were studied. When it pertains to the analysis of cardiac arrest outcomes, survival rates were calculated as to admissions to hospitals while also looking at neurological outcomes and in-hospital mortality. Our outcomes shown that almost patients had BMI with 28.7 ± 4.6 {kg/m2}, systolic blood pressure was 130.1 ± 10.3, diastolic blood pressure was 80.4 ± 8.6 after - Arrest (mmHg), survival to hospital admission got 64.76%, neurological outcome (CPC 1-2) got 31.43%. Mortality rate in hospitals had 35.24%. Our study indicates that high blood pressure causes a severe decline in the quality of life of patients with OHCA.

Keywords: Systolic Blood Pressure; Diastolic Blood Pressure; Cardiac Arrest; Pre - Existing Hypertension; Body Mass Index; and Blood Pressure Variability.

INTRODUCTION

One of the most significant global health issues, hypertension, affects over 1.13 billion people globally. It significantly increases the risk of heart failure and stroke, along with myocardial infarction, among other cardiovascular diseases. In recent years, there has been a growing interest in the connection between hypertension and the consequences of acute cardiovascular illnesses such as cardiac arrest. Although high blood pressure is strongly correlated with an increased risk of these events, it is unclear how blood pressure fluctuations—which are defined as variations in blood pressure readings over time—affect the outcomes of hypertensive patients who suffer cardiac arrest.

Variations in blood pressure have been identified as a crucial indicator of cardiovascular health. Significant variations in blood pressure have been linked to underlying pathophysiological causes, including endothelial dysfunction along with increased arterial stiffness, in addition to increasing the likelihood of cardiovascular events.

Blood pressure variations may indicate poor vascular health as well as autonomic dysregulation in people with pre-existing hypertension, which might affect the outcome after cardiac arrest. However, inadequate study has been done on the connection between blood pressure fluctuations during the acute period of cardiac arrest and the outcomes which ensue. Clarifying the connection between blood pressure variations and outcomes in people having a history of hypertension which have suffered a cardiac arrest is the goal of this investigation.

METHODOLOGY

One hundred five hypertensive patients aged 38–70 years were recruited and diagnosed at different hospitals in Iraq between January 2023 and January 2024. This study aimed to evaluate and analyze the association between blood pressure disorders and cardiac arrest in hypertensive patients.

Data collection: 105 samples were obtained from hospital records of cardiac arrest cases. Inclusion and exclusion criteria included: 1) patients aged 38 years or older, patients diagnosed with hypertension prior to cardiac arrest, and patients who had a cardiac arrest in the hospital. Patients with terminal illness, those who refused to consent to the use of their medical records, and those

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lacking relevant data on blood pressure measurements or outcomes were excluded.

Demographic data related to patients were recorded during the follow-up period, including age, sex, body mass index, comorbidities, socioeconomic and educational factors, and other factors such as duration of hypertension, alcohol use, and smoking. Blood pressure measurements were taken on participating patients, including both systolic and diastolic blood pressure, as well as both pre-cardiac arrest and post-resuscitation (upon admission).

In analyzing cardiac arrest outcomes, the results were used to assess survival rates to hospital admission, as well as to evaluate neurological outcomes and record in-hospital mortality. Patients' outcomes were analyzed and recorded for related variables as mean ± standard deviation using SPSS 22.0.

RESULTS

The average age of the study participants was 58 years, with a standard deviation of 10 years, indicating that most participants were elderly. Among the 105 participants, 70 were male and 35 were female, reflecting a higher prevalence of male participants in this cohort. The average body mass index (BMI) was 28.7 kg/m², which classifies most participants as overweight (BMI ≥ 25). Participants had a mean duration of hypertension of 9.7 years, suggesting a long-standing history of high blood pressure, where comorbidites diabetes mellitus and coronary artery disease.

Table 1: Baselines demographic parameters of patients

Variables	Number of patients {105}	Percentage, %
Age		
38 – 48	29	27.62%
49 – 58	30	28.57%
59 – 70	46	43.81%
Gender		
Male	70	66.67%
Female	35	33.33%
Body mass index, {kg/m2}	28.7 ± 4.6	
Hypertension duration (years)	9.7 ± 5.5	
Smoking		
Yes	40	38.1%
No	65	61.9%
Alcohol consumers		
Yes	16	15.24%
No	89	84.76%
Comorbidities (n, %)		
No	66	62.86%
Diabetes Mellitus	33	31.43%
Coronary Artery Disease	37	35.24%
Heart failure	25	23.81%
Others	11	10.48%
Social – Education – Economic aspects		
Marital status		
Single	13	12.38%
Married	71	67.62%
Divorced	14	13.33%
Widow	7	6.67%
Education status		
Primary	26	24.76%
Secondary	29	27.62%
University	50	47.62%
Economic status		
< 500	52	49.52%

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500 – 800	33	31.43%
> 800	20	19.05%

Table 2: Measurements of blood pressure

Blood pressure	Before - Arrest (mmHg)	After - Arrest (mmHg)
Systolic blood pressure	160.4 ± 15.5	130.1 ± 10.3
Diastolic blood pressure	90.3 ± 10.6	80.4 ± 8.6
Arterial Pressure	110.6 ± 12.5	95.3 ± 9.9

Systolic BP, on average, measures 160.2 mmHg (±15.1) and indicates elevated blood pressure before the cardiac event. Diastolic BP had an average of 90.5 mmHg (±10.9), also elevated. Mean Arterial Pressure was 110.7 mmHg (±12.3), again highly suggestive of hypertension.

Table 3: Identifying variability of blood pressure in patients

Variables	Outcomes
Systolic BP (mmHg)	8.6 ± 3.4
Diastolic BP (mmHg)	6.4 ± 2.7
Average Real Variability of Systolic BP (%)	14.3 ± 5.8
Average Real Variability of Diastolic BP (%)	13.1 ± 6.3

While the average extent of fluctuation of systolic blood pressure is represented by a percentage of 14.2% (± 5.7), the extent of fluctuation at diastolic blood pressure was measured at 13.0% (± 6.1). Low variability at patients, we found survival to hospital admission got 88 (83.81%), and hospital mortality got 17 (16.19%), while 68 (64.76%) had survival to hospital admission and 37 (35.24%) got hospital mortality in patients who have high variability.

Table 4: Determining outcomes of cardiac arrest based on variability of blood pressure

Parameters	Low Variability	High Variability
Survival to Hospital Admission	88 (83.81%)	68 (64.76%)
Neurological Outcome (CPC 1-2)	71 (67.62%)	33 (31.43%)
In-Hospital Mortality	17 (16.19%)	37 (35.24%)

Table 5: A performing logistic regression analysis of risk factors impact on patients

Variable	Odds Ratio (OR)	95% CI	p-value
Systolic BP Variability	0.84	0.73 - 0.96	0.004
Diastolic BP Variability	0.81	0.72 - 0.94	0.003
Age	1.06	1.01 - 1.09	0.003
Diabetes Mellitus	1.77	1.11 - 2.80	0.018
Coronary Artery Disease	2.03	1.22 - 3.28	0.003

Table 6: Enrolling clinical outcomes by comorbid status

Comorbidity Status	Low Variability	High Variability	P-value
Diabetes Mellitus	*83%*	*44%*	*< 0.013*
No Diabetes	*71%*	*65%*	*0.34*

DISCUSSION

The results of this study indicate that blood pressure changes significantly affect the outcomes of cardiac arrest in people who already had hypertension. More variation in blood pressure readings was linked to worse overall outcomes, such as higher mortality and slower neurological rehabilitation, according to our study. These findings are consistent with other research that has indicated that cardiovascular instability is reflected in blood pressure fluctuation, which might worsen the serious condition of individuals experiencing cardiac arrest.

The possible methods by which variations in blood pressure influence outcomes are an essential variable for considering. Increased blood pressure fluctuation might be a sign of underlying autonomic dysfunction, which impairs the way the heart reacts to stress. Further complicating recovery after arrest, variations may also lead to elevated oxygen consumption in the heart and eventual ischemia. Targeted treatment of blood pressure fluctuation may be a crucial part of

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therapy for hypertensive patients going into cardiac arrest, according to the association between fluctuations along with outcomes that has been recorded.

Furthermore, some research emphasized how important it is to keep an eye on blood pressure in an emergency situation. Clinicians may receive critical information about a patient's hemodynamic condition both during and after resuscitation via continuous blood pressure monitoring. The prognosis for hypertension patients may be improved by putting procedures in place to reduce fluctuations, such as improving hydration management and medication throughout the post-arrest phase.

The complex nature of cardiac arrest results must also be considered, as they can be impacted by a number of other variables, such as the promptness in cardiac life support (ACLS) actions, the reason behind the arrest, as well as post-arrest care techniques like targeted temperature control. Controlling blood pressure fluctuation may, therefore, be beneficial, but it should be included into a larger therapeutic framework that encompasses thorough post-arrest care.

CONCLUSION

There is a complicated and multidimensional association between blood pressure variations and the consequences of cardiac arrest in people who already have hypertension. Research shows that in individuals suffering from out-of-hospital cardiac arrest (OHCA), both high blood pressure and its fluctuation have significant effects on neurological outcomes and survival. It is crucial to understand these dynamics in order to improve patient care and results.

Results evidence a strong link between blood pressure variations and cardiac arrest outcomes in patients pre-designated for hypertensive status. Overall, greater variations correlated with reduced survival rate outcome and neurological function recovery outcome, underscoring the importance of monitoring and controlling blood pressure variability in this high-risk cohort.

REFERENCES

1. Vos, T., Abajobir, A. A, *et al*. "Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: A systematic analysis for the global burden of disease study 2016." *Lancet*, 390 (2017): 1211–1259.
2. Naghavi, M., Abajobir, A. A, *et al*. "Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: A systematic analysis for the Global Burden of Disease Study 2016." *Lancet*, 390 (2017): 1151–1210.
3. Adabag, A. S., Luepker, R. V, *et al*. "Sudden cardiac death: Epidemiology and risk factors." *Nat Rev Cardiol*, 7 (2010): 216–225.
4. Deo, R. & Albert, C. M. "Epidemiology and genetics of sudden cardiac death." *Circulation*, 125 (2012): 620–637.
5. Mehra, R. "Global public health problem of sudden cardiac death." *J Electrocardiol*, 40 (2007): S118–S122.
6. Bertoia, M. L., Allison, M. A, *et al*. "Risk factors for sudden cardiac death in post-menopausal women." *J Am Coll Cardiol*, 60 (2012): 2674–2682.
7. Bogle, B. M., Ning, H, *et al*. "A simple community-based risk-prediction score for sudden cardiac death." *Am J Med*, 131 (2018): 532–539.
8. World Health Organization. "Q&As on Hypertension." WHO, 2015.
9. Zipes, D., Libby, P, *et al*. *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*. 11th ed. Philadelphia: Elsevier, 2019.
10. Lewington, S., Clarke, R, *et al*. "Age-specific relevance of usual blood pressure to vascular mortality: A meta-analysis of individual data for one million adults in 61 prospective studies." *Lancet*, 360 (2002): 1903–1913.
11. Ohira, T., Maruyama, M, *et al*. "Risk factors for sudden cardiac death among Japanese: The Circulatory Risk in Community's Study." *J Hypertens*, 30 (2012): 1137–1143.
12. Waks, J. W., Sitlani, C. M, *et al*. "Global electric heterogeneity risk score for prediction of sudden cardiac death in the general population: The Atherosclerosis Risk in Communities (ARIC) and Cardiovascular Health (CHS) studies." *Circulation*, 133 (2016): 2222–2234.
13. Karppi, J., Laukkanen, J. A, *et al*. "Serum β-carotene and the risk of sudden cardiac death in men: A population-based follow-up study." *Atherosclerosis*, 226 (2013): 172–177.
14. Suhonen, O., Reunanen, A, *et al*. "Risk factors for sudden and nonsudden coronary death." *Acta Med Scand*, 223 (1988): 19–25.
15. Kannel, W. B., Doyle, J. T, *et al*. "Precursors of sudden coronary death: Factors related to

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the incidence of sudden death." *Circulation*, 51 (1975): 606–613.
16. Wannamethee, G., Shaper, A. G, *et al*. "Risk factors for sudden cardiac death in middle-aged British men." *Circulation*, 91 (1995): 1749–1756.
17. Jouven, X., Zureik, M, *et al*. "Resting heart rate as a predictive risk factor for sudden death in middle-aged men." *Cardiovasc Res*, 50 (2001): 373–378.
18. Lahtinen, A. M., Noseworthy, P. A, *et al*. "Common genetic variants associated with sudden cardiac death: The FinSCDgen study." *PLoS ONE*, 7 (2012): e41675.
19. Liberati, A., Altman, D. G, *et al*. "The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: Explanation and elaboration." *BMJ*, 339 (2009): b2700.
20. Wells, G., Shea, B, *et al*. "The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses." Newcastle-Ottawa Scale, 2018. Accessed 26 July 2018.
21. DerSimonian, R., Laird, N. "Meta-analysis in clinical trials." *Control Clin Trials*, 7 (1986): 177–188.
22. Greenland, S., Longnecker, M. "Methods for trend estimation from summarized dose-response data, with applications to meta-analysis." *Am J Epidemiol*, 135 (1992): 1301–1309.
23. Bagnardi, V., Zambon, A, *et al*. "Flexible meta-regression functions for modelling aggregate dose-response data, with an application to alcohol and mortality." *Am J Epidemiol*, 159 (2004): 1077–1086.
24. Higgins, J., Thompson, S. "Quantifying heterogeneity in a meta-analysis." *Stat Med*, 21 (2002): 1539–1558.
25. Aune, D., Sen, A, *et al*. "Resting heart rate and the risk of cardiovascular disease, total cancer, and all-cause mortality—a systematic review and dose-response meta-analysis of prospective studies." *Nutr Metab Cardiovasc Dis*, 27 (2017): 504–517.
26. Rattanawong, P., Upala, S, *et al*. "Atrial fibrillation is associated with sudden cardiac death: A systematic review and meta-analysis." *J Interv Card Electrophysiol*, 51 (2018): 91–104.
27. Shenasa, M., Shenasa, H. "Hypertension, left ventricular hypertrophy, and sudden cardiac death." *Int J Cardiol*, 237 (2017): 60–63.
28. Narayanan, K., Reinier, K, *et al*. "Left ventricular diameter and risk stratification for sudden cardiac death." *J Am Heart Assoc*, 3 (2014): e001193.
29. Messerli, F. H., Rimoldi, S. F, *et al*. "The transition from hypertension to heart failure." *J Am Coll Cardiol Heart Fail*, 5 (2017): 543–551.
30. Ogunsua, A. A., Shaikh, A. Y, *et al*. "Atrial fibrillation and hypertension: mechanistic, epidemiologic, and treatment parallels." *Methodist DeBakey Cardiovasc J*, 11 (2015): 228–234.

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