EFFICACY OF ACETAZOLAMIDE IN MANAGEMENT OF ACUTE DECOMPENSATED HEART FAILURE WITH VOLUME OVERLOAD

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Introduction

Heart failure (HF) is a major global health concern, affecting 1–3% of the adult population and leading to frequent hospital admissions. Acute decompensated heart failure (ADHF) is a life-threatening condition marked by rapid worsening of chronic HF symptoms, commonly associated with volume overload. Despite advancements in therapy, ADHF remains a major clinical challenge. Traditional treatment includes loop diuretics to relieve fluid overload. However, diuretic resistance and adverse effects on renal function limit their efficacy. Acetazolamide, a carbonic anhydrase inhibitor with diuretic properties, has emerged as a potential adjunct therapy to improve decongestion without worsening kidney function. This study investigates the impact of adding acetazolamide to standard loop diuretic therapy in managing volume overload among patients with ADHF and reduced ejection fraction.

Aim of the Work

The aim of this study was to assess whether the addition of acetazolamide to loop diuretics improves decongestion in patients with acute decompensated heart failure with volume overload.

Patients and Methods

This randomized, single-blind, placebo-controlled prospective study was conducted on 150 patients with ADHF and LVEF ≤40% at Alexandria Main University and Student Hospitals. Patients were randomized into two groups: one received IV loop diuretics plus placebo; the other received loop diuretics plus 500 mg oral acetazolamide daily.

Exclusion criteria included hypotension, significant renal impairment, and acute coronary syndromes. Patients were assessed clinically and via laboratory and imaging studies on admission and monitored over 3 days. The primary endpoint was successful decongestion, defined as resolution of volume overload signs without therapy escalation. Secondary endpoints included hospital stay duration, renal function, and electrolyte abnormalities.

Results

Table 1: Comparison between the two studied groups according to Urine Output (UOP)

	UOP (ml/hr)	Group 1 (n = 75)	Group 2 (n = 75)	U	p
Day 1	**0 – 6 hr**				
	Min. – Max.	150.0 – 250.0	250.0 – 350.0	161.50*	<0.001*
	Mean ± SD.	204.7 ± 36.46	284.3 ± 29.57		
	Median (IQR)	200.0 (175.0 – 237.5)	275.0 (275.0 – 300.0)		
	>6 – 12 hr				
	Min. – Max.	100.0 – 250.0	150.0 – 350.0	2025.0*	0002*
	Mean ± SD.	205.3 ± 49.03	229.7 ± 54.94		
	Median (IQR)	225.0 (162.5 – 250.0)	250.0 (150.0 – 250.0)		
	>12 – 24 hr				
	Min. – Max.	100.0 – 200.0	150.0 – 300.0	2210.50*	0.019*
	Mean ± SD.	187.33 ± 21.50	207.33 ± 50.80		
	Median (IQR)	200.0 (175.0 – 200.0)	225.0 (150.0 – 250.0)		
Day 2	Min. – Max.	50.0 – 250.0	75.0 – 300.0	2236.50*	0.027*
	Mean ± SD.	145.67 ± 55.96	167.3 ± 57.83		
	Median (IQR)	150.0 (100.0 – 200.0)	175.0 (125.0 – 200.0)		
Day 3	Min. – Max.	50.0 – 225.0	60.0 – 250.0	2258.0*	0.035*
	Mean ± SD.	126.0 ± 46.58	146.7 ± 57.50		
	Median (IQR)	125.0 (87.50 – 150.0)	150.0 (100.0 – 200.0)		

Table 1 showed that there were statistically significant increases in urine output at days 1, 2 and 3 among patients in group 2 compared with group 1 (P value<0.05).

Table 2: Comparison between the two studied groups according to hospital stay

	Group 1 (n = 75)	Group 2 (n = 75)	U	P
Hospital stay				
Min. – Max.	4.0 – 13.0	3.0 – 8.0	986.00*	0.001*<
Mean ± SD.	9.17 ± 2.38	6.63 ± 1.0		
Median (IQR)	9.0 (7.0 – 11.0)	7.0 (6.0 – 7.0)		

Table 2 showed that there was a statistically significant decrease in the mean days of hospital stay among group 2 compared with group 1.

Conclusion

- The addition of acetazolamide to loop diuretic therapy in patients with ADHF significantly improved decongestion outcomes compared to loop diuretics alone.
- Patients receiving acetazolamide achieved better fluid management with shorterhospital stays and no increase in renal or electrolyte complications.
- These findings suggest that acetazolamide is a safe and effective adjunct in managing volume overload in ADHF.