LACTATE TO ALBUMIN RATIO AND SYSTEMIC IMMUNE INFLAMMATION INDEX AS PROGNOSTIC MARKERS OF MORTALITY IN POLYTRAUMA PATIENTS

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Introduction

Polytrauma is defined as the presence of two or more injuries, at least one of which may be life-threatening, affecting multiple body regions or organ systems. It is a leading cause of mortality and disability among young adults. The condition triggers a complex immune and inflammatory response, including systemic inflammatory response syndrome (SIRS) and compensatory anti-inflammatory mechanisms, which can lead to multiple organ dysfunction syndrome (MODS) and increased risk of sepsis and death. Current prognostic tools like the Injury Severity Score (ISS) and physiological markers help assess severity but remain limited in predicting outcomes, highlighting the need for more objective markers in polytrauma care.

Aim of the Work

The aim of study was to evaluate the role of lactate to albumin ratio and systemic immune inflammation index as prognostic markers of mortality in polytrauma patient at admission.

Patients and Methods

The required sample was collected over a period of eight months, with a minimum sample size of 70 patients who were admitted to Alexandria Main University Hospital through the Emergency Department and had a history of polytrauma according to the inclusion criteria.

Results

Table 1: Relation of Lactate to Albumin (L/A) Ratio to specific management and ICU admission among studied polytrauma cases

	Study Sample (No. = 70)	Test of significance (p)
	Lactate to Albumin ratio (L/A)	
Need for ICU admission		
• Positive	1.03 ± 0.65	
Mean ± SD		
Median (Min.- Max.)	0.80(0.22-2.76)	(U= 884.5,P<0.001*)
• Negative		
Mean ± SD	0.48 ± 0.26	
Median (Min.- Max.)	0.42(0.17-1.15)	
Need for Mechanical Ventilation		
• Positive		
Mean ± SD	0.98 ± 0.58	
Median (Min.- Max.)	0.81(0.22-2.50)	(U= 864,P=0.003*)
• Negative		
Mean ± SD	0.68 ± 0.60	
Median (Min.- Max.)	0.45(0.17-2.76)	
Vasopressor support		
• Positive		
Mean ± SD	1.19 ± 0.70	
Median (Min.- Max.)	0.95(0.31-2.76)	(U= 975.5,P<0.001*)
• Negative		
Mean ± SD	0.55 ± 0.28	
Median (Min.- Max.)	0.50(0.17-1.20)	

Table 2: Relation of Lactate to Albumin (L/A) Ratio to specific management and ICU admission among studied polytrauma cases

Specific Investigation	Study sample (No. = 70)		Test of significance (p)
	Survivors (n = 46)	Non-survivors (n = 24)	
Lactate to Albumin ratio (L/A)			
Mean ± SD	0.80 ± 0.63	0.91 ± 0.57	(U=43,P=0.134)
Median (Min. - Max.)	0.60(0.17-2.76)	0.68(0.31-2.50)	
Systemic immune inflammation index (SII) (x10^3/µL)			
Mean ± SD	2400.82 ± 2548.50	2356.08 ± 2379.01	(U= 557,P=0.95)
Median (Min. - Max.)	1711.79 (83.82-11392.46)	1445.84 (64.31-9136.63)	

Table 3: Relation of Systemic immune inflammation index (SII) to specific management and ICU admission among studied polytrauma cases

	Study Sample (No. = 70)	Test of significance (p)
	Systemic immune inflammation index (SII) (x10^3/µL)	
Need for ICU admission		
• Positive	2440.60 ± 2688.71	
Mean ± SD		
Median (Min.- Max.)	1760.85(64.31-11392.46)	(U= 502,P=0.53)
• Negative		
Mean ± SD	2279.84 ± 2051.01	
Median (Min.- Max.)	1481.44(321.36-7672.22)	
Need for Mechanical Ventilation		
• Positive		
Mean ± SD	2340.09 ± 2781.08	
Median (Min.- Max.)	1148.19(64.31-11392.46)	(U= 512,P=0.247)
• Negative		
Mean ± SD	2436.37 ± 2120.39	
Median (Min.- Max.)	1830.97(230.61-7672.22)	
Vasopressor support		
• Positive		
Mean ± SD	2849.65 ± 2969.88	
Median (Min.- Max.)	2036.76(64.31-11392.46)	(U= 661,P=0.532)
• Negative		
Mean ± SD	1994.59 ± 1919.65	
Median (Min.- Max.)	1178.89(173.12-7672.22)	

Conclusion

- Lactate-to-albumin (L/A) ratio proved to be a valuable biomarker for predicting the need of intensive management, including ICU admission, mechanical ventilation, and vasopressor support in polytrauma patients. However, it did not independently predict mortality outcomes.
- Systemic immune-inflammation (SII) index did not demonstrate any predictive utility for ICU requirements or mortality in polytrauma patients.