

Diagnostic Value of Biochemical Parameters in The Prognosis of Patients with Severe Burns

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Abstract

Objective: Prognosis in hospitalized burn patients and their arrival is important. The purpose of this study is to determine the diagnostic value of biochemical parameters in the prognosis of patients with severe burns.

Material and Methods: In a cross-sectional study - an analysis of emergency department patients with burns in the Tabriz University of Medical Sciences, the diagnostic value of biochemical parameters in the prognosis of patients with severe burns was studied.

Results: Twenty-six patients were male and 24 were female. The mean age of males was 9.93 ± 29.76 and of female patients was 13.34 ± 31.63 years ($p=0.616$). The mean duration of hospitalization for men was 9.83 ± 14.29 days and for females was 12.44 ± 14.79 days ($p=0.887$). Average percentage of burn patients, male was 16.13 ± 36.57 and the average percentage of female patients with burns was 16.77 ± 43.05 percent ($p=0.221$). Alkaline levels ($p=0.594$), lactate ($p \leq 0.001$), creatine phosphokinase levels ($p=0.403$), amylase ($p=0.139$) and CRP ($p=0.114$) there was no significant difference in outcome levels.

Conclusion: Lactate levels in the third phase is higher than in the second phase of the first stage. The amount of lactate levels are significantly different outcome ($p < 0.01$) (*JAEM 2014; 13: 15-7*)

Key words: Biochemical parameters, prognosis, severe burn

Introduction

Major burns result in prominent pathologic alterations in the patient's respiratory and circulatory systems. Due to negligence of determining severity and progression of j, insufficient treatment might cause irreversible problems (1).

Numerous pro-inflammatory cytokines (2-5) are released in response to systemic inflammation in burns, and anti-inflammatory cytokines are released to control the effect (4). Any changes in these factors can disrupt the balance and trigger metabolic mediated proteins (3, 6-8).

Excess protein and enzyme loss can increase the possibility of infection, sepsis and metabolic level, requiring excess amino acids as a result. Simultaneous multi organ failure is usually fatal (9).

Prognosis is important in the patient's admission and hospitalization in burn centers. The purpose of this study is to evaluate the value of diagnostic biochemical parameters in patients with major burns.

Material and Methods

We have studied the diagnostic value of biochemical parameters in patients with major burns by a cross-sectional descriptive analytic assay in the ED department of Tabriz Medical University.

Regarding texts and medical resources, $n=50$ sample size it was decided who was admitted or referred to Siena hospital with severe burn injuries, after taking the patient's or proxy's consent. Patients over 10 and under 50 years of age were selected. Patients with inhalation burn and complication due to burns were excluded.

All patients had their first blood sample taken usually at the ED department. Samples were sent in the next 24 hours (by daily blood test) to check for any Creatine phosphokinase, alkaline phosphatase, amylase, lactate, C-reactive protein and fibrinogen serum markers. The patient's condition was pursued in three time phases (the first 24 hours, in discharge, 3 months after the discharge). Eventual morbidity and mortality rate and the correlation between mentioned

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markers and short-term, mid-term and long term outcomes were considered.

Statistical Analysis

Data were recorded in the Statistical Package for Social Science (SPSS) 15.0 and descriptive and outcome were run and Estimated Marginal Means, general linear model was investigated for any correlation. Sensitivity and specificity of each marker was estimated, if relevant, and the Cut off point was defined.

Results

In a 50 case survey with severe burns (more than 20% Total Body Surface burnt with grade 2 or 3), hospitalized and treated in the Siena hospital, results were as follows:

There were 26 males with the median age range of 29.76±9.93 years and 24 females with the median age range of 31.63±13.34. No prominent relation was seen among ages in two genders (p=0.616).

Average hospitalization period in males was 14.29±9.83 days and 14.79±12.44 days in females.

On average, the total percentage of area burned in males was 36.57±16.13 and 43.05±16.77 in females.

Results show that serum lactate serum level is related (relation level less than 0.05) meaning that the lactate amount in the three serum levels is significantly different.

Post hoc test following investigation indicates a greater lactate level in the third phase than in the second phase and the least in the first phase (Figure 1).

In addition lactate rate is statistically greater in mortality cases than in morbidity or normal cases (Table 1).

Discussion

Defining prognosis from different aspects is of great importance when patients are admitted to burn centers. Since 1949, when the

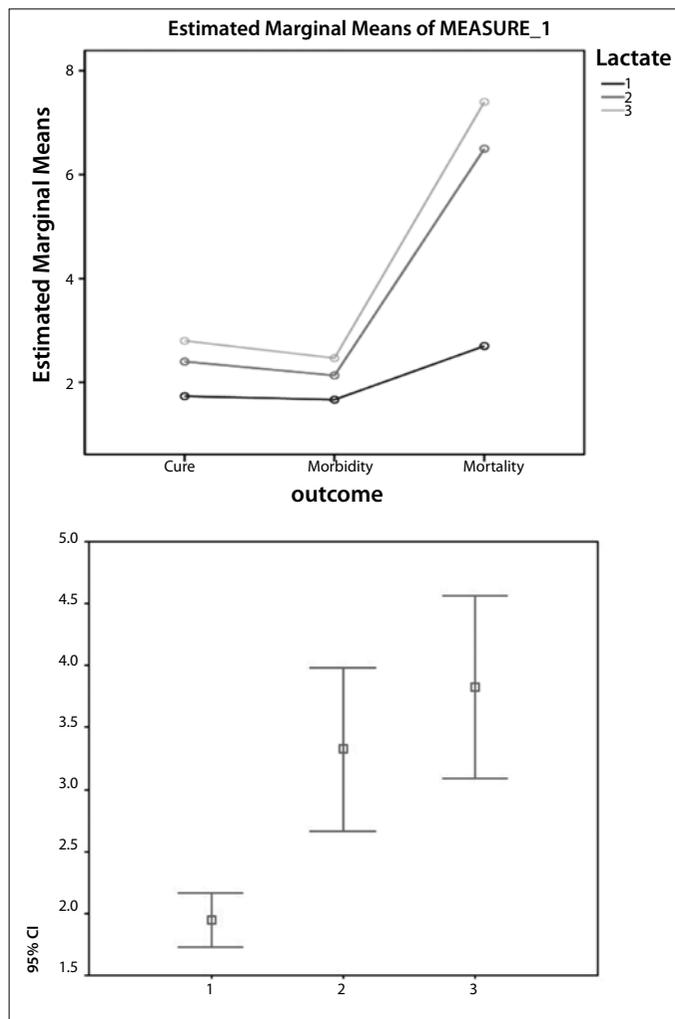


Figure 1. Lactate level range in studied patients

Table 1. Laboratory parameters in the first 24 hours, in the discharge and 3 months later

	Outcome			p
	Mortality	Morbidity	Normal	
	Mean±Std Deviation	Mean±Std Deviation	Mean±Std Deviation	
alkaline1	178.00±140.68	193.93±103.74	189.33±60.17	0.927
alkaline2	200.50±80.96	196.33±82.55	166.47±46.57	0.398
alkaline3	202.80±85.27	197.20±81.65	162.33±45.69	0.398
cpk1	409.45±344.53	274.40±285.86	202.13±241.90	0.220
cpk2	342.40±268.30	266.40±299.64	212.20±309.43	0.565
cpk3	321.00±268.01	264.33±299.44	216.07±305.10	0.684
amylase1	46.72±16.93	45.87±29.76	38.27±14.76	0.548
amylase2	65.20±26.53	48.07±54.98	32.13±13.49	0.105
amylase3	69.00±32.14	46.53±59.13	29.73±13.01	0.072
hs.crp1	27.50±11.65	35.73±7.98	27.07±18.75	0.182
hs.crp2	28.20±12.26	37.93±5.46	32.87±14.14	0.109
hs.crp3	28.90±13.52	38.93±10.01	35.27±14.78	0.174
lactate1	2.70±.48	1.67±.49	1.73±.59	<0.001
lactate2	6.50±1.58	2.13±.64	2.40±.51	<0.001
lactate3	7.40±1.51	2.47±.64	2.80±.77	<0.001

first research on predicting death probability in burnt cases was published, 15 risk models were suggested in these patients. The most well-known model by far is the Baux system-the subtotal of Total Body Surface Area (TBSA) and patient's age- that can anticipate death possibility (2). In some models, efforts have been made to set up a quick and simple method of determining the risk.

In our study we used the chemical biomarkers lactate, CRP, CPK, amylase and alkaline for prognosis of patients with major burns. In this research, no significance was noted. During recent years, the alkaline plasma fraction is considered as a suitable index in tissue blood supply status and resuscitating process assessment in traumatic patients. On the other hand, predicting prognosis of injured patients is considerable. In burns, tissue blood supply can be assessed by reduction plasma alkali fraction and serum lactate growth. The index is more sensitive and specific than vital signs (blood pressure, pulse rate) and urine output helps the doctor to an efficient resuscitation (7-10).

Numerous studies have proved that, although there is a normal urine output and normal blood pressure, tissue blood circulation may be insufficient. In these cases the alkaline plasma fraction is decreased and plasma lactate is increased (8, 11-13).

Lactate serum levels and base deficit increase in severely burnt patients. These parameters can be used for prognosis (7).

There are several reports on using lactate and alkaline plasma fraction for anticipating mortality and shock morbidity.

In some studies a reduced alkaline plasma fraction in multiple trauma patients is the most important factor in predicting death rate on admission (5, 14) on the condition that hyperchloremic acidosis has not resulted in reduced alkaline plasma fraction (15).

Cartoto noted deficient tissue blood circulation by inappropriate resuscitation, the remarkable factor in plasma alkaline fraction decrease. According to Hosain, plasma lactate is better as a shock and resuscitation marker than the plasma alkaline fraction, while plasma alkaline fractions were different only in the first 24 hours of admission in surviving and deceased traumatic patients (8). Another report suggests that plasma alkaline and lactate levels in the first 24 hours of admission in both groups can be trusted in forecasting the consequence in burnt patients. It also claims that return of the alkaline fraction to normal in the first 24-hours can subsequently reduce mortality risk (16). More attention is advised in resuscitation monitoring in order to exclude factors which may reduce the plasma alkaline fraction e.g. local extremity ischemia, chemical burn, inhalation injury, normal saline prescription and abdomen compartment syndrome.

Study Limitations

This study was done on 50 patient in one burn center, it would be of benefit to carry out a multi-center study on more patients.

Conclusion

In our study there was a meaningful increase between patient lactate levels and intense burns after thermal trauma in the advocated named reports, with significant discrepancy in lactate rate and outcome levels. Lactate outcome interaction observed as lactate rate in diverse serum compounds is related to outcome. Statistical analyses reveal greater lactate level in the third phase than the second phase and greater in the second phase than in the first. Moreover, lactate rate is statistically greater in mortality than it is in morbidity and normal cases.

Ethics Committee Approval: To conduct the study received approval from the Ethics Committee of the Tabriz University of Medical Sciences

Informed Consent: was filled for all patients and the patient who had loss of consciousness his or her proxy filled the informed consent.

Peer-review: Externally peer-reviewed.

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Conflict of Interest: The authors declare that there is no conflict of interest.

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