

Predicting outcomes in patients with liver failure in intensive care: Is phosphate a useful biological marker?

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Introduction

Phosphate level abnormalities in patients with acute liver failure have been observed and discussed across a range of contexts, including as a potential aid in prognosis for liver transplantation, and in paracetamol induced liver failure (1-3). Hypophosphatemia is generally considered to be associated with better outcomes and possible mechanisms such as increased phosphate use during hepatocyte regeneration have been suggested (4). In the intensive care setting admission with decompensated liver disease still carries a high mortality risk and the clinical value of its prognosis is reflected in the multitude of scoring systems in use and under development (5). In this study we wanted to investigate the potential value of phosphate levels as prognostic marker in liver failure patients admitted to intensive care.

Objectives

To determine whether there is an association between phosphate level on admission and mortality in patients admitted to the intensive care unit with liver failure.

Methods

The study was a retrospective analysis of data collected from patients admitted to Royal Glamorgan Hospital and Prince Charles Hospital intensive care units with acute liver failure or a history of chronic liver failure between December 2018 and December 2020. Patient phosphate was categorised as high, normal, or low based on blood test results at the time of admission to ITU. This was then compared with survival outcomes during that hospital admission.

All ITU patient admission data reviewed from December 2018 to December 2020

77 patients identified who were admitted with acute liver failure or with a history of chronic liver failure.

72 patients included in final analysis. 5 patients excluded

Table 1: Table of results.

	Survived	Died	Total
High Phosphate	4 (16%)	21 (84%)	25
Normal Phosphate	21 (63.6%)	12 (36.4%)	33
Low Phosphate	11 (78.5%)	3 (21.5%)	14
Total	36	36	72

Results

There were 77 patients admitted with acute or chronic liver failure during the studied period. 5 of these were excluded from the final analysis, 4 due to documented administration of phosphate supplementation prior to ITU admission and blood sampling, and 1 whose phosphate level was not recorded. Survival rates were 16.0% (4 of 25) in patients with high admission phosphate, 63.6% (21 of 33) in patients with normal admission phosphate, and 78.5% (11 of 14) in patients with low admission phosphate. Chi-squared analysis showed statistical significance with $\chi^2(2,76) = 18.586$ and $p < 0.001$. (Table 1)

Conclusions

Hyperphosphatemia is associated with a poor survival outcome for patients admitted to intensive care with liver failure and hypophosphatemia is associated with improved survival outcomes. Further larger prospective studies are recommended to validate these findings.

The Authors declare no conflicts of interest.

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