Impact of vitamin D – parathyroid - calcium axis on clinical outcome in critically ill patients

Thesis

Submitted In Partial Fulfillment of

Master Degree Critical Care Medicine

BY

Ekhlas Hosny Abd El Aziz

M.B.B.CH

Under supervision of

Sameh Kamal EL Maraghi

Assistant Prof. of critical care medicine

Faculty of Medicine - Beni - suef University

Ahmed Yehia Zakaria

Assistant Prof. Of Critical Care Medicine

Faculty of Medicine - Cairo University

Amr Mohamed Esmat

Lecturer Of Critical Care Medicine

Faculty of Medicine - Al Fayoum University

Faculty of medicine
Beni- Suef University
2015

Summary

The objective of this study to evaluate the prevalence of hypovitaminosis D in the intensive care unit and its relationship with severity & clinical outcomes and to evaluate changes in PTH-vitamin D calcium axis during critical illness.

This study was an observational prospective study that included 45 consecutive critically ill patients presenting to critical care department at Kasr ELAini and Fayoum university hospitals and were expected to stay in the ICU for more than 2 days. The study was performed during the period from December 2013 to December 2014 and were divided into two groups:

1) Predominantly Cardiac patients that included 19 patients admitted with congestive heart failure (22.2%) and acute coronary syndrome (20%) .

2) Predominantly Non- Cardiac patients that included 26 patients admitted with Sepsis and Multi-Organ failure (31.1%),COPD (type 2 respiratory failure) (15.6%) and Cerebro-vascular Stroke (11.1%).

Serum 25 hydroxyvitamin D level was measured on admission and either on day 7 or on day of discharge , Serum parathyroid hormone was measured on admission and either on day 7 or on day of discharge and serum total and ionized calcium was measured on admission and either on day 7 or on day of discharge .

Our study showed that (64.4%) had hypovitaminosis D on admission, from whom (42.2%) had deficient levels and (22.2%) had insufficient levels. On measuring vitamin D level on day 7 or on discharge (86.6%) had hypovitaminosis

D from whom(73.3%) had deficient levels and (13.3%) had insufficient levels. The mean of Vit. D level on admission compared to vit. D level on day 7 or on discharge dropped indicating a significant drop of the Vit. D levels in these patients during their ICU stay. Also there was a statistically significant decrease in vitamin D levels on admission compared to day 7 or discharge among congestive heart failure, sepsis and multi-organ failure but this was not evident in acute coronary syndrome, COPD (type 2 respiratory failure) and Cerebro-vascular Stroke patients.

Our study showed that (80%) of the patients had high parathyroid hormone levels on admission with a mean of (106.9 ± 4.97) with a significant increase on day 7 or on discharge with a mean of (133.4 ± 88.3) .Also our study patients showed that (97.8%) of patients had low total calcium levels on admission with a mean of (8.3 ±1.1) and all studied patients had low ionized calcium levels on admission with a mean of (4.1 ± 1.8).

On comparing Ventilated versus Non- Ventilated patients, Our results showed that vitamin D levels were higher in Non- Ventilated patients compared to Ventilated patients but reached only statistical significance on day 7 or on discharge. Vitamin D deficiency might play a role in the dependency of these patients of mechanical ventilation. Also PTH levels were lower in Non-Ventilated compared to Ventilated patients but with no statistical significance.

Our study showed that patients with low Vit. D level on admission had an ICU stay duration more than those with normal Vit. D level with significant P-value of 0.02.

Regarding the outcomes, Survivors were compared to Non- Survivors concerning the scores to asses severity of the disease, level of Vit. D and parathyroid hormone. There was statistically significant difference between Survivors and Non-Survivors as regards the APACHE II Score [(15.9 ± 7.5), (28.6 ± 4.9)] respectively. SOFA Score on admission was in survivors (6.5 ± 2.5) compared to non survivors (10 ± 3.6) with p-value 0.01 indicating statistically significant difference, while SOFA Score on day 7 or on discharge was in survivors (6.2 ± 2.1) compared to non survivors (15.5 ± 3.7) with p-value of less 0.001 indicting a highly statistically significance difference. Also there was no statistically significant difference between survivors and non survivors on admission as regards vitamin D while there was highly statistically significance difference between survivors and non survivors on day 7 or on discharge with P-value 0.003.indicating that the drop in level of vit D during ICU stay is linked to mortality.

To determine the optimal cut off for Vit. D and Parathyroid hormone as a possible predictor of outcome, Receiver- operating characteristic (ROC) curves were done. The optimal cut off point of vitamin D on admission (6.9 ng/ml) and on day 7 or on discharge (3.5 ng/ml) with sensitivity (75%) on admission and (50%) on day 7 or on discharge and specificity of (30%) on admission and on day 7 or on discharge was (22.5%). Also The optimal cut off point of parathyroid hormone on admission (79.5 Pg/mL) &on day 7 or on discharge (135 Pg/mL) with sensitivity (100%) on admission & on day 7 or on discharge and specificity of (32.5%) on admission & specificity on day 7 or on discharge was (67.5%).