Abstract

Introduction: sepsis and septic shock is characterized by oxidative stress that mainly promotes systemic inflammation and organ failure due to excessive free radical production and depletion of antioxidant defenses. Therefore, we investigated the effect of selenium administration on antioxidant status, levels of cytokines and clinical outcomes.

Methodology: this study was a prospective randomized control trial (RCT) whereby patients received selenium as sodium selenite (2 mg IV bolus followed by 1.5mg continuous infusion for 14 days) plus standard therapy. The control group received standard therapy without selenium. The primary endpoint was 28- day mortality. The changes in the mean levels of glutathione peroxidase (GPX) activity, IL-6, IL-8 and IL-10, the incidence of ventilator associated pneumonia (VAP) and other secondary endpoints were also recorded. VAP was broken down into early VAP and Late VAP to see the clinical significance of each. We also recorded any adverse outcomes from selenium infusion.

Results: Over 24 months period, 54 patients were recruited and randomized and an intention to treat (ITT) principle was applied (selenium, n = 29; control, n = 25) in the final analysis. There was no statistically significant difference between the two groups in 28-day mortality although it was lower in the selenium group compared with the control group: 9 (31%) in the selenium versus 10(40%) in the control groups (p = 0.49). At day 0, GPX- activity was 0.185±0.3 versus 0.19±0.3 U/mL (p = 0.9), day 3, GPX-activity was 0.52±0.5 versus 0.17±0.2 U/mL (p = 0.02), at day 7 it was 0.55±0.5 versus 0.24±0.3 U/mL (p = 0.032), at day 10 it was 0.62±0.7 versus 0.33±0.4 U/mL (p = 0.048) and at day 14 it was 1.1±1versus 0.89±1 U/mL (p = 0.70) for the selenium versus control groups, respectively. However, there were no significant differences between the mean plasma levels of all the three inflammatory cytokines at any point in time

between the two groups. There was a significant reduction in occurrence of VAP in the selenium group compared with the control group (55.2% versus 84%, p = 0.023), respectively.

Conclusion: High dose selenium administration within the time frame of early goal directed therapy was not resulted in reduction of 28-day mortality, but increased the activity of glutathione peroxidase with no effect on the levels of inflammatory cytokines at any point in time in mechanically ventilated septic patients. However, selenium supplementation in mechanically ventilated patients following sepsis was associated with reduced occurrence of VAP (Trial registration: IRCT201212082887N4 at WHO Clinical Trial Registry, August 29, 2014)

Key words: Severe sepsis, septic shock, selenium, ventilator associated pneumonia, ventilator associated pneumonia