

Dexmedetomidine plays a protective role against leukocyte mediated lipid peroxidation and apoptosis in lung tissues of septic rats

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Aim

This study is designed to differentiate the effects of two different dosage of dexmedetomidine on lung injury induced by sepsis. Moreover, this study aimed to show whether the effects of dexmedetomidine on lung injury was related to systemic ICAM-1 release, neutrophil accumulation and apoptosis of alveolar epithelial cells.

Methods

42 Wistar rats weighing 250-300 g were included in this study. After CLP surgery and sham procedure, the rats in 5DEX group received 5 µg/kg/hr dexmedetomidine; rats in 10DEX group received 10 µg/kg/hr dexmedetomidine; rats in sham and control groups received equal volume of saline. 6 hours after CLP, 3 rats of sham group and 6 rats of control, 5DEX, and 10DEX groups were anesthetized with ketamine/xylazine combination and blood samples were withdrawn for the measurements of TNF-α, IL-1β and ICAM-1 analysis. 24 hours after CLP, lung samples were collected for MPO concentration, histologic examination, and tunel staining for apoptosis detection.

Results

TNF-α levels were significantly lower in the 10DEX group compared to both 5DEX and control groups. Serum ICAM-1 levels were significantly lower in 10DEX compared to 5DEX and control groups. Activity of MPO in lung significantly increased in control group 24 hour after CLP compared to sham and study groups. MPO activity reduced significantly in lung tissue samples obtained from rats in 10DEX group compared to 5DEX and control groups.

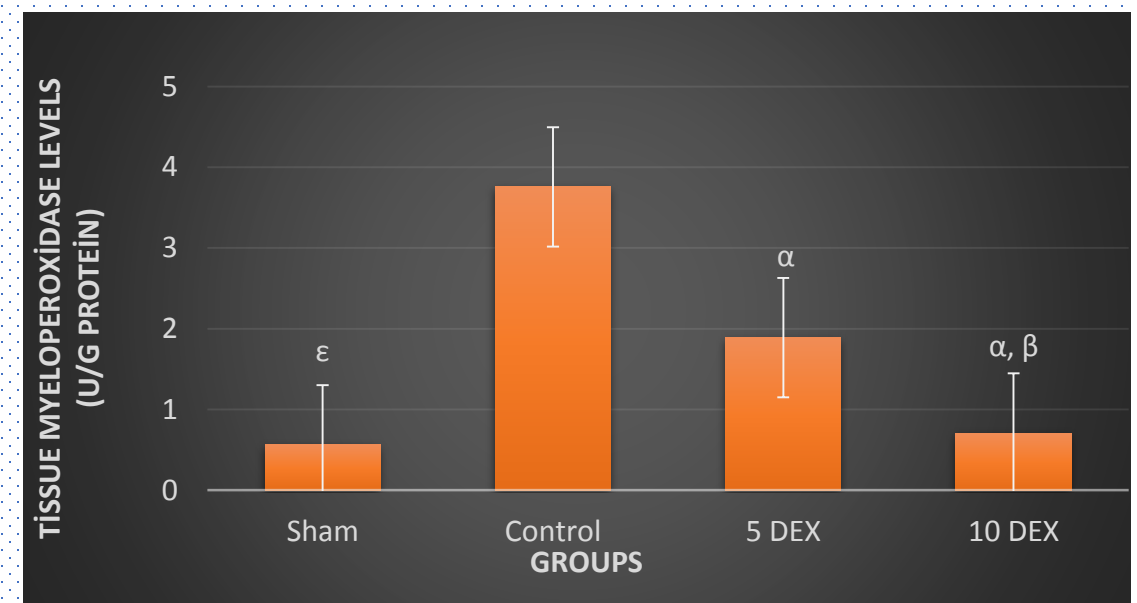


Figure 2. Lung tissue myeloperoxidase levels of rats 24 hour after CLP

The total lung injury score and apoptotic cell count were lower in both 5DEX and 10DEX groups than the control group.

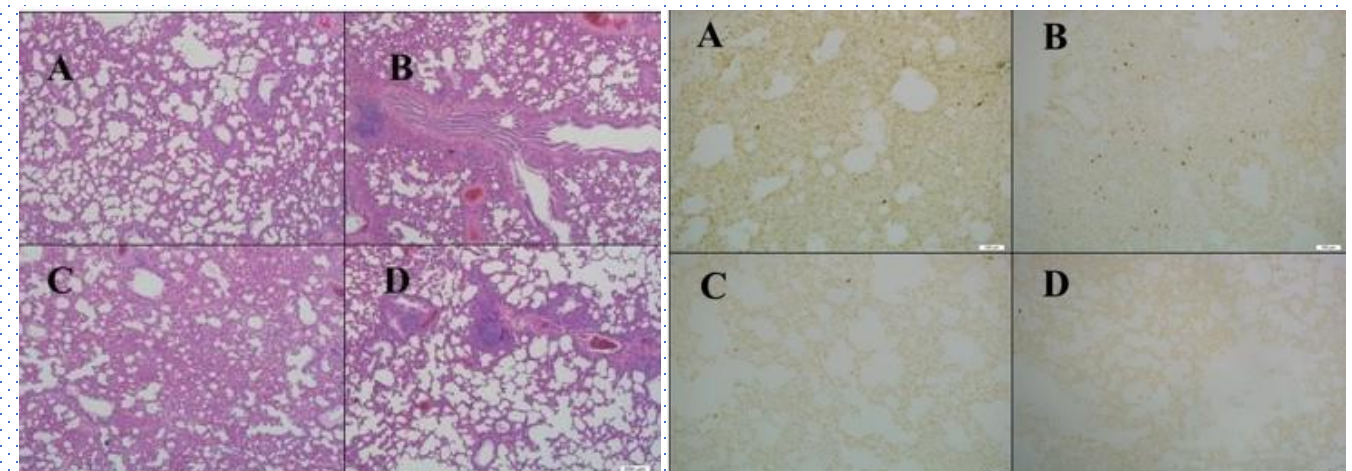


Figure 3. Images of lung sections

Conclusion

The present study demonstrated that dexmedetomidine infusion at high dosage effectively suppressed the systemic inflammatory response, leukocyte mediated lung injury and apoptosis of lung tissue. As a conclusion, this experimental model provides that dexmedetomidine have a potential clinical application for reducing sepsis related lung injury.

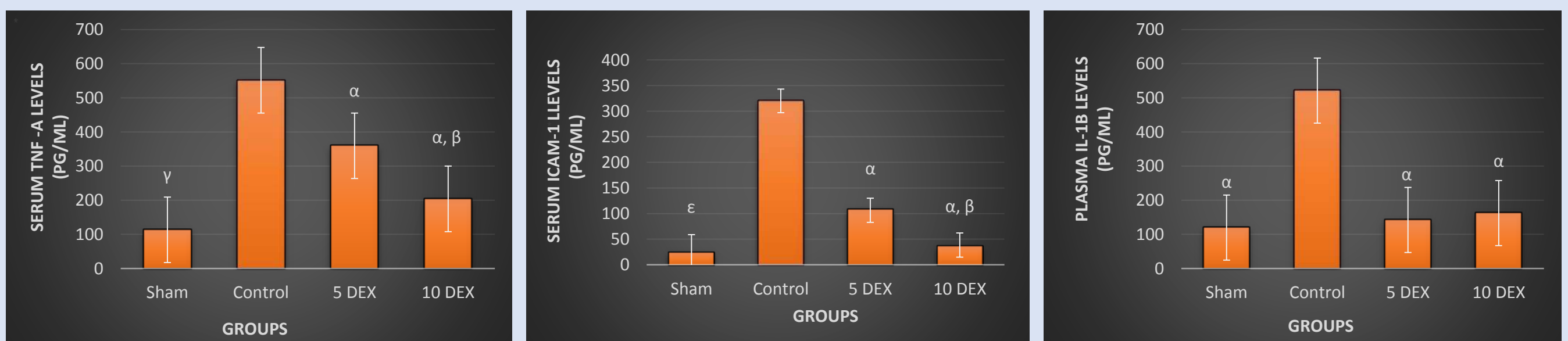


Figure 1. TNF-α, IL-1β, and ICAM-1 concentrations in rats 6 hours after CLP