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Research Report

# Dexamethazone protects against *Escherichia coli* induced sickness behavior in rats

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ABSTRACT

Systemic bacterial infection results in systemic inflammatory response syndrome due to the release of lipopolysaccharide (LPS) in blood that can lead to multiple organ failure, shock, and potentially death. Other impact, LPS exposure produces robust increase in anxiety-like behavior, suppression of locomotor, exploratory activity, and reduced social behavior. The therapeutic use of glucocorticoids in septic shock remains one of the first-aid approaches for their anti-inflammatory properties. The aim of this study was to evaluate the possible protective effect of dexamethazone (DEX), the most commonly used corticosteroid, against *Escherichia coli* (*E. coli*) immunohistochemical changes and neurobehavioral dysfunction. To this end, male Sprague-Dawley rats were divided into four groups; (1) Control group (2) *E. coli* infected group, where animals received 0.2 ml of 24 h growth of *E. coli* suspension in nutrient broth containing approximately $1.8 \times 10^8$ cfu/ml i.p for once, 48 h before sacrificing (3) DEX (20 mg/kg, i.p, 3 days) treated group (4) DEX and *E. coli* treated group. The results revealed that DEX significantly protected animals against most *E. coli*-induced behavioral deficits, reduced signs of cognitive impairment. DEX also reduced the LPS-evoked rise in C-reactive protein (CRP), Interferon gamma (IFγ), as well as, expression of Caspase-3. In conclusion, DEX provides neuroprotection against *E. coli*-associated neurobehavioral and immunological changes via its anti-inflammatory and immunomodulatory effects.



## 1. Introduction

During pathogen exposure or some forms of stress, proinflammatory processes induce an array of motivated and behavioral adjustments termed "sickness behaviors" (Hennessy et al., 2014). Sickness behavior refers to the coordinated set of behavioral changes that develop in sick individuals during the course of an infection. Sickness behavior is characterized by non-specific symptoms like fever, prolong sleep, decrease in food and water intake, reduced

Abbreviations: (LPS), lipopolysaccharide; *E. coli*, *Escherichia coli*; (DEX), Dexamethazone; (CRP), C-reactive protein; (IFγ), Interferon gamma; (NO), Nitric oxide; (Casp-3), Caspase-3; (iNOS), inducible nitric oxide synthase.

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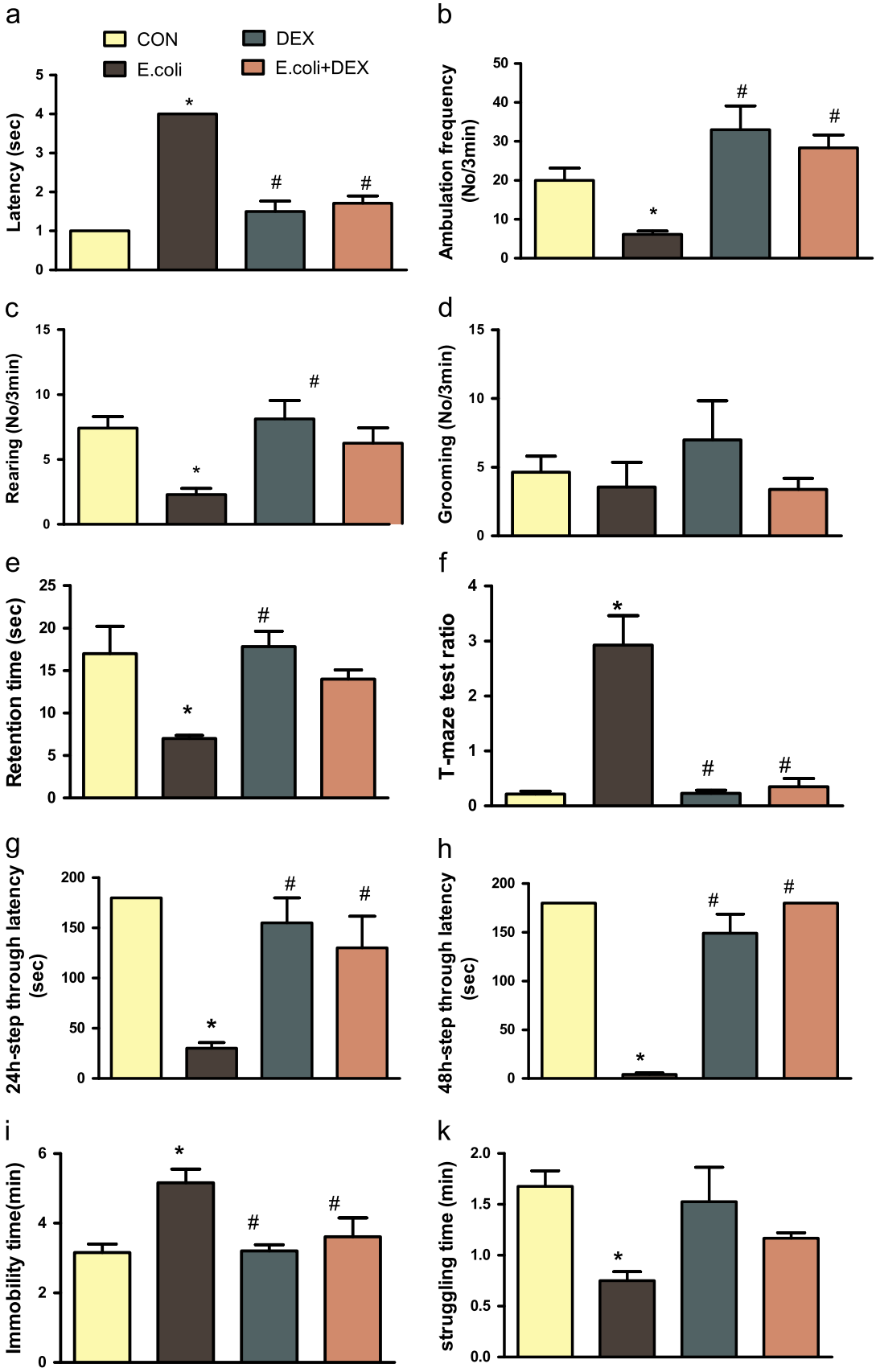


**Fig. 1 – Effect of administration of dexamethasone (DEX; 20 mg/kg, i.p, 3 days) on open field latency (a) total ambulation frequency (b) rearing (c) grooming (d) rotarod retention time (e) T-maze ratio (f) passive avoidance 24 h (g), 48 h (h) step through latency, immobility (i) and struggling time (j) in forced swimming test in *E. coli* -induced sickness behavior in rats. Data represents mean ($n=10$) $\pm$S.E.M. $^{*\#}P<0.05$ compared to the vehicle- (CON) and *E. coli* -infected groups, respectively. Statistical analysis was carried out by by one way ANOVA followed by Tukey–Kramer Multiple Comparison Test.**