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# EFFECTS OF DEHYDROEPIANDROSTERONE IN THE CENTRAL NERVOUS SYSTEM ON BLADDER FUNCTION IN MALE RATS

Hypothesis / aims of study
Clinical studies in our hospital concerning lower urinary tract symptoms (LUTS) and serum levels of sex hormones revealed the significant correlation between the storage symptoms and dehydroepiandrosterone (DHEA) in old men. The aim of this study was to investigate the contribution of DHEA in the central nervous system to bladder function in male rats.
Study design, materials and methods
Male Sprague-Dawley (S-D) rats (10 weeks old) were used in this study. An animal model of DHEA deficiency was constructed by bilaterally adrenalectomized rat followed by replacement treatment with deoxycorticosterone acetate (25mg/kg/day). First serum levels of DHEAS, corticosterone, aldosterone, ACTH and free testosterone were determined. Secondly cystometrography in conscious rats was performed. Insertion of a polyethylene catheter through the bladder dome was performed using halothane anesthesia. Bladder activity was monitored via the cystometry catheter connected to a pressure transducer. Two cystmetric parameters (bladder capacity and bladder contraction pressure) were determined from each cystometry. The effects of intracerebroventricular DHEA (10-100 nM) or vehicle (dimethyl sulfoxide) on bladder function were examined in control and DHEA deficiency rats.
Results
DHEAS level significantly decreased in adrenalectomized rat. In control group, there was no significant difference in cystmetric parameters between intracerebroventricular administration of DHEA and vehicle. In DHEA deficiency group, intracerebroventricular administration of DHEA significantly increased bladder capacity compared with the vehicle group ($p<0.05$). No significant differences in bladder contraction pressure were found between DHEA and vehicle.
Interpretation of results
These results suggest that DHEA may exert an inhibitory effect on bladder function in brain. DHEA is the primary precursors of sex steroids, and shows weak androgenic action. Recent research has demonstrated beneficial effects of DHEA on obesity, diabetes, cancer, atherosclerosis, enhancement of memory and viral infection. However, there is no data available that describe the effects on LUTS. DHEA also modulates the activity of several neurotransmitter receptors as the neurosteroids, synthesized steroids in brain. Neurosteroids appear to act through both nuclear and nonnuclear receptor mechanisms. With respect to nonnuclear receptor actions, DHEA has been reported to act at γ-amino-butyric acid A ($GABA_A$), *N*-methyl-D-aspartate (NMDA) and/or sigma receptor. DHEA may modulate the activity of several neurotransmitter receptors on the micturition center in the brain as the neurosteroids. Overactive bladder (OAB) syndrome is defined as urgency, with or without urge incontinence, usually with frequency and nocturia. The pathophysiology of OAB is complex, and involves both neurogenic and non-neurogenic factors, in fact, the proportion of idiopathic cases is high. There is a marked decrease in serum DHEA concentrations throughout adult life after a peak in early adulthood. Therefore, especially in old men, OAB could be affected by serum DHEA level.
Concluding message
We investigated the contribution of DHEA in the central nervous system to bladder function in male rats. An animal model of DHEA deficiency was successfully constructed by bilaterally adrenalectomized rat followed by replacement treatment with deoxycorticosterone acetate. In the DHEA deficiency group, intracerebroventricular administration of DHEA significantly increased bladder capacity compared with the vehicle group. DHEA may modulate the activity of several neurotransmitter receptors on the micturition center in the brain as the neurosteroids.

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