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THE EFFECT OF KOREAN RED GINSENG EXTRACT ON RELAXATION RESPONSE ON THE ANIMAL BLADDER AND PROSTATIC URETHRA : IN VITRO AND IN VIVO STUDY

Hypothesis / aims of study

To assess the relaxation effect of the Korean red ginseng(KRG) on the bladder and prostatic urethra and its therapeutic potentials for benign prostatic hyperplasia (BPH)/lower urinary tract symptoms (LUTS).

Study design, materials and methods

Korean red ginseng extract derived from the root of *Panax ginseng* provided from the Korean Ginseng Corporation. Ginseng extract was dissolved in phosphate buffered saline (PBS) at concentration of 10^{-7} to 10^{-2} mol/L. For the in vitro study, prostatic urethra muscle strips were harvested from 18 male New Zealand rabbits. The strips were mounted in organ baths and connected to force displacement transducers. After stabilization, maximal tissue contractions were obtained by the addition of phenylepinephrine for urethra strips. When the contraction was stabilized, a dose-response curve of KRG saponin was constructed (10^{-7} to 10^{-2}). After pretreatment urethra strips with N-nitro-L-arginine methyl ester (L-NAME) which is nitric oxide blocker, a dose-response curve of Korean red ginseng was constructed. For the in vivo study, 30 adult male Sprague-Dawley rats composed of three groups-1: normal control group, 2: partial bladder obstruction model with normal diet, 3: partial bladder obstruction model with saponin fed (dose of 50mg/Kg/day for 3 months). At 6 weeks after bladder outlet obstruction, the rats were prepared for urodynamic study. Under inhalation anaesthesia, peak vesical pressure, baseline urethral perfusion pressure during contraction, minimal urethral perfusion pressure during relaxation were measured.

Results

In the in vitro study, we observed significant relaxation effect of KRG saponin on prostatic urethra strips which were precontracted by 10^{-4} mol/L phenylepinephrine in a dose-dependent manner. At 10^{-2} M, saponin induced a significant relaxation of the urethra strips by 0.011 voltage. The relaxant effect was partially blocked after N-nitro-L-arginine methyl ester (L-NAME) pretreatment. (figure 1) In the in vivo study, baseline vesical pressure and urethral perfusion pressure during urethral relaxation and was significantly lower in KRG administration group than control group ($p < 0.001$). (Table 1)

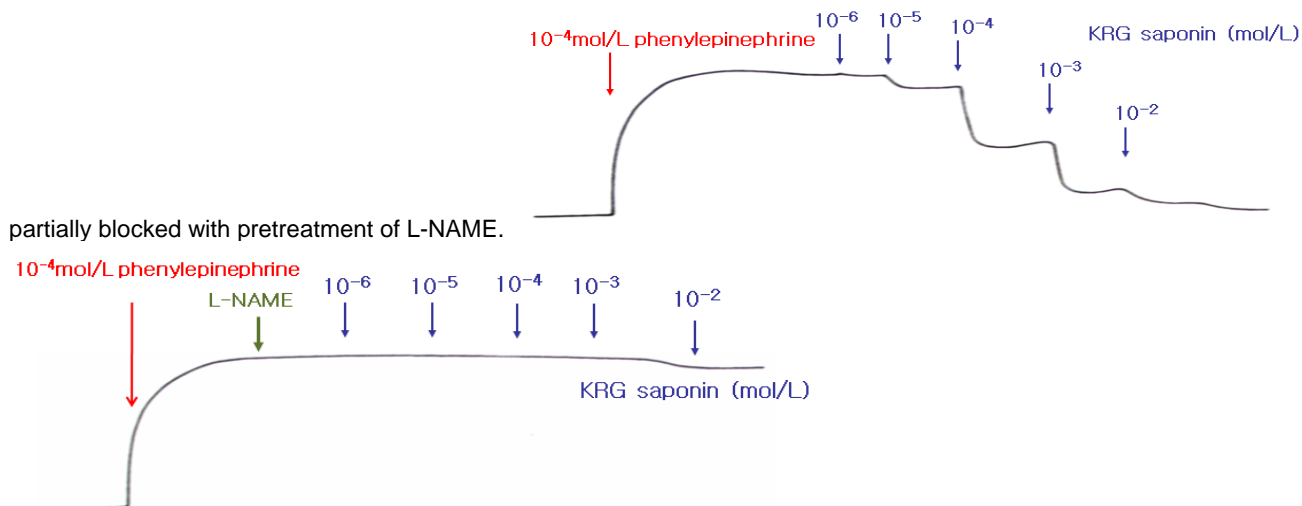
Interpretation of results

Korean red ginseng saponin reduces prostatic urethra pressure and has a dose-related relaxing effects on the prostatic urethra therefore might improve obstructive symptoms of BPH/LUTS and protective effect against secondary bladder deterioration due to BPH-induced BOO.

Concluding message

KRG saponin has relaxant effects on the prostatic urethral smooth muscle via NO/NOS pathway. We expect KRG could be applied as an alternative treatment for BPH/ LUTS.

Fig. 1. Dose-response curves of red ginseng saponin in rabbit prostatic urethral strips relaxation. The relaxing effect was



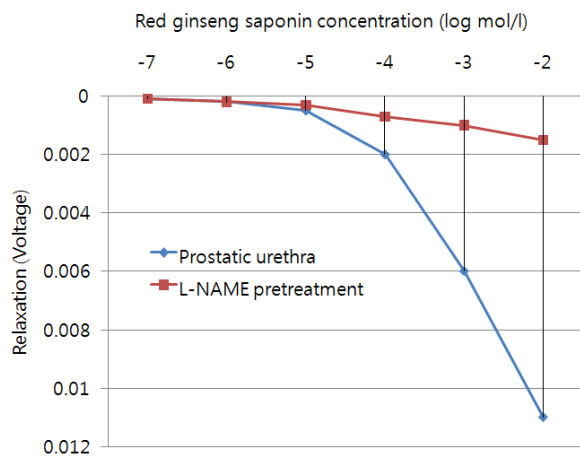


Table 1. Urodynamic parameters of three rat groups. (Group 1: normal control group, group 2: PBOO (partial bladder outlet obstruction) with normal diet, group 3: PBOO group with red ginseng saponin fed group)

	Group 1	Group 2	Group 3	
UPP _{basal} , cmH ₂ O	0.907 ± 0.0112	0.889 ± 0.0052	0.905 ± 0.0188	
UPP _{nadir} , cmH ₂ O	0.889 ± 0.015	0.880 ± 0.007	0.883 ± 0.0038	
UPP _{gap} , cmH ₂ O	-1.178 ± 0.005	-0.008 ± 0.005	-0.022 ± 0.008	<i>P=0.001*</i>
P _{ves} , cmH ₂ O	0.080 ± 0.009	0.114 ± 0.042	0.086 ± 0.015	<i>P=0.026*</i>
P _{pves} , cmH ₂ O	0.103 ± 0.009	0.131 ± 0.039	0.109 ± 0.006	
P _{vesgap} , cmH ₂ O	0.021 ± 0.010	0.016 ± 0.006	0.023 ± 0.016	

UPP_{basal} : baseline urethral perfusion pressure, UPP_{Nadir} : urethral perfusion pressure during relaxation, UPP_{gap} : difference between UPP_{basal} and UPP_{Nadir}, P_{ves}: baseline vesical pressure
P_{pves}: vesical pressure during bladder contraction, P_{vesgap}: vesical pressure change between peak and baseline pressure
*Statistically significant between group 2 and 3

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Is this a clinical trial?	No
What were the subjects in the study?	ANIMAL
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	Yes
Name of ethics committee	Korea university Institutional Animal Care and Use Committee(IACUC)