

THE ANTIOXIDANT DIET PROTECTS THE BLADDER AGAINST THE DETRUSOR DAMAGE INDUCES BY THE CHRONIC INFRAVESICAL OBSTRUCTION: RESULTS FROM A MODEL OF BENIGN PROSTATIC HYPERPLASIA

Hypothesis / aims of study

Recently, experimental studies have demonstrated a positive association between the triggering of HBS and generation of free radicals (1,2). The results from an experimental study involving smooth muscle fragments subjected to periods of repeated electrical stimulation demonstrated high levels of lipid peroxidation products, and decreased smooth muscle contractility in the bladder, proportional to the level of oxidative stress (1). Masick et al (5) demonstrated the existence of deterioration in muscle contraction, and also the emergence of oxygen-reactive species, in the bladders of animals subjected to chronic urethral obstruction. These authors suggested that the formation of free radicals was an important factor in decreasing the detrusor contractility seen in patients with benign prostatic hyperplasia.

This study was developed to determine whether the generation of free radicals, induced by ischemia followed by reperfusion in a model of chronic infravesical obstruction, would lead to damage in the detrusor. Furthermore, it investigates the protective action of the galangin on the tissue lesion induced by lipid peroxidation in the bladders.

Study design, materials and methods

Thirty male guinea pigs were utilized in the experiment. The animals were divided into three groups. Group A was subjected to a sham procedure; group B to partial obstruction of the bladder neck; and group C to partial obstruction and received a diet rich in the flavonoid galangin for four weeks preceding and four weeks following the procedure. Four weeks after the procedure, all the animals were subjected to urodynamic evaluation and then sacrificed. The bladders were sent for measurement of malondialdehyde and total antioxidant capacity and for *in vitro* assessment of the isometric strength of the muscle fragments.

Results

The urodynamic evaluation showed that the obstructed group (group B) developed significantly greater numbers of involuntary contractions of the detrusor during the bladder-filling phase ($p < 0.05$), greater post-micturition residue ($p < 0.05$) and lower compliance ($p < 0.05$). The group A animals (sham procedure) presented TEAC levels that were statistically greater than in the animals subjected to infravesical obstruction without antioxidant-rich diet (group B)(figure 1).

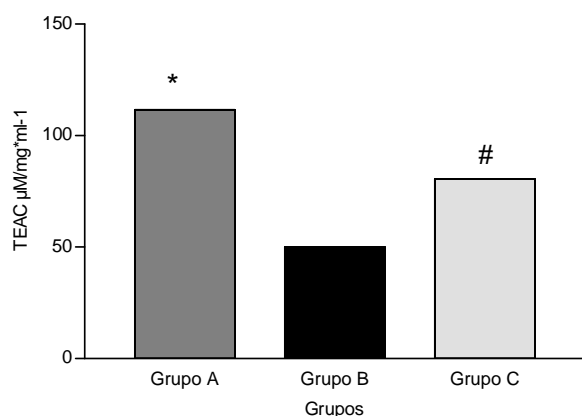


Figure 1

Comparative analysis of group A (sham), B (obstructed) and C (obstructed + galangin) demonstrated that there were significantly greater malondialdehyde levels in group B in relation to groups A and C (respectively: 0.19 ± 0.069 ; 0.72 ± 0.03 and 0.17 ± 0.04). From the *in vitro* assessment, it was seen that group B presented statistically smaller contraction amplitudes than did groups A and C, in electrically stimulated contractions (figure 2).

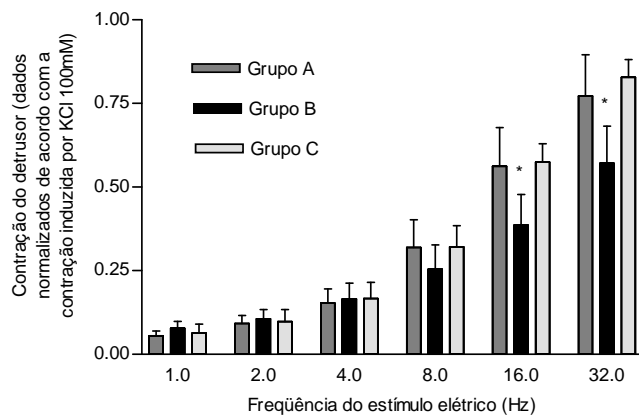


Figure 2

Interpretation of results

These results allow the conclusion that oxidative stress is implicated in the damage to the detrusor musculature following a period of chronic infravesical obstruction. We have also shown that administration of an antioxidant prior to and following the start of chronic obstruction makes it possible to avoid the cellular lesions that cause detrusor dysfunction.

Concluding message

The findings described in the present study allow the conclusion that oxidative stress has a role in the damage to the detrusor musculature that results from a period of chronic infravesical obstruction. We have also, for the first time, shown that administration of an antioxidant prior to and following the start of chronic obstruction makes it possible to avoid the cellular lesions that cause detrusor dysfunction.

From a broader perspective, it is suggested that benign prostate hyperplasia (BPH) is associated with induced free radical formation. Free radicals would therefore be at least partially responsible for the different degrees and types of micturitional dysfunction seen during the evolution of these patients. Together with this hypothesis, it is also suggested that the use of antioxidants would have a protective role against micturitional dysfunction during the follow-up of patients with BPH.

References

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2. Masick JM, Levin RM, Hass MA. The effect of partial outlet obstruction on prostaglandin generation in the rabbit urinary bladder. *Prostaglandins Other Lipid Mediat*, 66:211-219, 2001.

FUNDING: Federal Foundation of Research, Brazil

ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by Ethical Committee of Federal University