

EFFECTS OF CYCLOHEXENONE LONG-CHAIN ALCOHOL ON BLADDER FUNCTION IN EXPERIMENTAL DIABETIC RATS

Hypothesis / aims of study

Cyclohexenone derivatives, were known to stimulate axonal elongation by acting on the central nervous system, and its mechanism of action is now beginning to be elucidated. With respect to the peripheral nervous system, there have been studies using diabetic rats, but the number of studies has been small. In the present study, we examined the effect of the cyclohexenone long-chain alcohol on bladder function in conscious experimental diabetic rats.

Study design, materials and methods

[Animals] We used 7-11 weeks old female Wistar rats. The rats with the blood sugar concentration exceeding 250 mg/dl measured one day after a single intraperitoneal injection of streptozotocin (60 mg/kg, dissolved in 0.05 M citrate buffer, pH 4.2) were randomly allocated to following two groups. The rats in one group received daily intraperitoneal administration of cyclohexenone long-chain alcohol at the dose of 8 mg/kg since one day after the injection of streptozotocin from the end of the experiments (STZ+C group). The rats in another group received daily intraperitoneal administration of the same volume of the vehicle (STZ group). The control rats administrated a single intraperitoneal injection of 0.05 M citrate buffer.

[Surgical Procedure] A lower midline abdominal incision was made under anesthesia with pentobarbital (30 mg/kg) and the bladder was exteriorized. A polyethylene catheter (PE-50, Becton Dickinson Co., Ltd.) was inserted into the bladder through the bladder dome. The catheter tunneled subcutaneously to the back of the rat and connected to a pressure transducer (Becton Dickinson Co., Ltd.) and an infusion pump (TE-331, TERUMO Co., Ltd.).

[Cystometry] Three hours after regaining consciousness, the rat was placed in a specially designed cage. A balance (EK120A, A&D Co., Ltd.) was placed under the cage to simultaneously determine single voided volume. 0.9% saline solution was infused at a rate of 1.2 ml/h. After a micturition had ceased, the infusion was stopped and the residual volume measured by aspiration from the catheter. The bladder pressure was printed out on a paper recorder (T-938, Pantos Co., Ltd.)

[Statistical analysis] We examined body weight, blood sugar concentration, single voided volume, basal pressure, micturition threshold pressure and maximal voiding pressure in each group. Comparisons between multiple groups were done using analysis of variance followed by Mann-Whitney U test. Differences were judged as statistically significant when the P value was less than 0.05.

Results

Final body weight significantly decreased in STZ group and STZ+C group than the controls. Blood sugar concentration of STZ group and STZ+C group increased immediately after the induction of diabetes. The increase in blood sugar concentration did not significantly differ in both groups. Single voided volume of STZ group and STZ+C group increased immediately. On 7 days after the induction of diabetes, there were no significant differences among these three groups in basal pressure and micturition threshold pressure, whereas maximal voiding pressure was increased in STZ group and STZ+C group. On 28 days after the induction of diabetes, basal pressure, micturition threshold pressure, and maximal voiding pressure in STZ group were significantly lower than the controls. Maximal voiding pressure in STZ+C group showed significantly higher than STZ group. (see table)

Concluding message

These findings indicate that cyclohexenone long-chain alcohol alleviated diabetic bladder dysfunction.

(Table)	Body weight(g)	Blood sugar (mg/dl)	Single voided Volume(cmH2O)	Basal pressure (cmH2O)	Micturition threshold pressure(cmH2O)	Maximal voiding pressure(cmH2O)
Control group(8 weeks old)	156.2±2.394	114.2±4.956	0.10±0.003	5.27±1.313	8.84±0.621	14.28±0.278
Control group(11 weeks old)	217.5±2.500	122.7±3.521	0.10±0.010	6.460±0.589	10.03±1.951	16.83±0.110
STZ group (7 days after induction of diabetes)	158.3±1.667	472.3±38.64*	0.27±0.026*	6.347±0.600	10.42±1.635	21.08±1.416*
STZ group (28 days after induction of diabetes)	185.0±8.660*	489.7±11.86*	0.31±0.046*	2.85±0.172*	5.10±0.589*	13.26±0.708*
STZ +C group (7 days after induction of diabetes)	158.3±4.410	441.3±28.66	0.28±0.056	5.44±0.680	12.6±3.853	22.66±0.988
STZ+C group (28 days after induction of diabetes)	198.0±6.442	480.4±24.31	0.39±0.051	4.48±1.150	9.65±2.022	22.42±2.120**
	# Mean±SD	* P < 0.05 (vs control group)		** P < 0.05 (vs STZ group)		