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FUNCTIONAL AND MOLECULAR BIOLOGIC CHANGES OF BLADDER IN OLETF DIABETIC RAT WITH AGE

Hypothesis / aims of study

Diabetic cystopathy is the most common neuropathy in the urologic area, which is one of the major complications of diabetes. A present time's research have been mostly achieved to studies about streptozotocin-induced type I diabetic rat. This study was undertaken to investigate the functional and molecular biologic changes of bladder according to period of diabetes mellitus in Otsuka Long Evans Tokushima Fatty (OLETF) rat model, which is similar with plentiful Type II diabetes to the human.

Study design, materials and methods

OLETF rats (n=14) and Long Evans Tokushima Otsuka (LETO, n=14) were used. LETO was normal control of OLETF. The animals were assigned to 4 groups: group 1; LETO 40 weeks after birth (n=7), group 2; OLETF 40 weeks after birth (n=7), group 3; LETO 60 weeks after birth (n=7), group 4; OLETF 60 weeks after birth (n=7). At 40 weeks or 60 weeks after birth, blood sugar levels were checked, cystometry (CMG) was performed and then, the bladder were dissected out and weighted. The mRNA expressions of nerve growth factor (NGF) & vascular endothelial growth factor (VEGF) in the detrusor muscle of 4 groups were analyzed using reverse transcriptase polymerase chain reaction (RT-PCR).

Results

The baseline blood sugar levels of each group were 106.4±9.1, 265.7±37.1, 112.4±8.3, 312.7±37.7 in group 1, 2, 3 and 4 groups. The Inter-contraction intervals (ICI) of each group were 139.6±15.2, 171.4±20.3, 122.4±18.2 412.7±35.3 in group 1, 2, 3 and 4 groups. The compliances of each group were 0.178± 0.03, 0.253± 0.05, 0.162±0.04 and 0.312±0.06 ml/cmH20. The bladder capacities of each group were 106.4±9.1, 265.7±37.1, 112.4±8.3 and 312.7±37.7mg in group 1, 2, 3 and 4 groups. The weight of bladder of 40 weeks in LETO and OLETF were 113.95±7.4, 135.53±14.9 mg and those of 60 weeks group weeks in LETO and OLETF were 127.38 ±8.3, 157.83 ±14.2 mg. The mRNA levels of NGF in each group were 0.58±0.18, 0.97±0.43, 0.64±0.30 and 0.83±0.43, and those of VEGF were 0.21±0.04, 0.26±0.04, 0.26±0.08 and 0.26±0.15.

Interpretation of results

The CMG showed that the diabetic bladders had an increased compliance (ICI & bladder capacity) compared to control group at 40 and 60 weeks, and 60 weeks group was more increased compliance than 40 weeks group. The weight of bladder of 40 weeks in OLETF was not increased as compared with that of control group, but those of 60 weeks was significant different (p>0.05). The mRNA expressions of NGF was increased in 40 weeks, 60 weeks compared to control group, but the expressions of VEGF was not significantly decreased in 40 weeks and 60 weeks compared to control group.

Concluding message

We think that the degree of diabetic cystopathy in OLETF rat was changed by age in type II diabetes mellitus (initial diabetic changes at 40 weeks and advanced changes at 60 weeks). There were obvious functional changes of bladder (Inter-contraction Interval, bladder capacity and compliance). The mRNA expression of NGF was prominent, but those of VEGF was minimal. More study will be necessary to understand functional & molecular biologic changes of diabetic cystopathy.

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