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Combination of low dose of Pioglitazone and omega-3 in a low dose and the effect on spermatogenesis and steroidogenesis in diabetic rats

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Abstract

Background: Chronic hyperglycemia is linked to either subfertility or infertility among diabetic males. Pioglitazone is one of the thiazolidinediones (TZDs) drugs that are selective peroxisome proliferator-activated receptor (PPAR- γ) agonists used for treating type 2 diabetes mellitus (T2DM).

Objective: : To explore the effect of low Pioglitazone dose and omega (ω -3) on rat male reproductive function. Furthermore, we evaluated the add-on effect of combined use of low Pioglitazone dose of and ω -3 on reproductive functions in adult male T2DM rats.

Method: Fifty adult male rats were included and subdivided into control and four test subgroups. T2DM was induced in test groups and subdivided into non-treated T2DM, ω -3 treated, 0.6 mg/kg Pioglitazone treated, and combined treated group (orally by gavage). Following 16 weeks, final body weight, testicular weight, fasting plasma glucose, and serum testosterone levels were measured. Semen analysis, testicular testosterone, malondialdehyde (MDA) concentrations, superoxide dismutase (SOD) activity, immunohistochemistry staining for apoptosis marker B-cell lymphoma protein 2 (Bcl-2), proliferation marker as proliferating cell nuclear antigen (PCNA), estrogen receptor α (ER α), androgen receptor (AR) were determined. Caspase-3, nuclear factor-kappa B (NF-kB), glucose transporter 3 (GLUT3), 17 β -hydroxysteroid dehydrogenases (17 β -HSD) PPAR γ , and PPAR α genes expression were analyzed by real-time polymerase chain reaction (RT-PCR).

Results: This study detected that low dose of Pioglitazone and ω -3 was significantly lowered the fasting plasma glucose and MDA levels. In addition, the damage, of a histological diabetes effect will be ameliorated, as well as improved antioxidant activity (SOD). Moreover, a significant improvement of anti-apoptosis BCL-2 and proliferation (PCNA), remarkably elevated ER α , AR, 17 β -HSD PPAR γ , and PPAR α expression with significant reduction in caspase-3, NF-kB genes expression. Beside that improvement of semen quality was noticed. Combined use of low dose of and ω -3 has better effects on all measured parameters.

Conclusion Small Pioglitazone dose and ω -3 possess beneficial effects on spermatogenic and steroidogenic functions in adult diabetic rat; while combined use of both has an add-on effect.

Keywords: PPAR; Pioglitazone; gene expression; hyperglycemia; omega-3; rat male fertility; real-time polymerase chain reaction.



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Biography

Dr Gehane El Gindy graduated from faculty of medicine of zagazig University. She has over 20 years experience as a lecturer of pharmacology. Since more than 10 years she is co-professor of pharmacology. She is interested in endocrine system and respiratory system. She is teaching her students general and other subjects of pharmacology.