

Correlations between beclin-1 and transforming growth factor- β 1 in letrozole induced polycystic ovary syndrome

Nermin M. Hamdy¹, Hala M. Ghanem², Mervat M. Mohamed¹, Fawzia A.A. Abd El-Rahman³ & Ahmed F. Soliman^{2*}

¹Assisted Reproductive Technology Unit, International Islamic Centre for Population Studies and Research, Al-Azhar University, Cairo, Egypt

²Biochemistry Department; ³Zoology Department, Faculty of Science, Ain Shams University, Cairo, Egypt

Received 20 May 2023; revised 21 October 2023

In the pathogenesis of polycystic ovary syndrome (PCOS), despite the importance of autophagy and transforming growth factor- β 1 (TGF- β 1), there is scarce information about their inter-relationship. Therefore, here we assessed the correlations between beclin-1, a cornerstone in autophagy, and TGF- β 1 in a letrozole-induced PCOS rat model. Accordingly, a total of 45 female adult albino Wistar rats were randomly assigned into control, vehicle (carboxymethyl cellulose), and PCO groups. To establish the PCOS model, letrozole (1.0 mg/kg body wt., p.o.) was given once daily for three successive weeks. Circulating levels of luteinizing hormone, follicle-stimulating hormone, testosterone, estradiol, and progesterone were assayed along with ovarian total antioxidant capacity (TAC), protein carbonyl content (PCC), beclin-1 level, and TGF- β 1 level. Ovarian morphology and ultrastructure were examined by hematoxylin and eosin staining and electron microscopy, respectively. Compared to control groups, hormonal levels and ovarian morphology in the letrozole-exposed animals indicated the successful construction of the PCOS model. Further, the PCO group exhibited an oxidative stress status reflected by a significant decrease in ovarian TAC and a significant elevation in the PCC. Moreover, ovarian beclin-1 and TGF- β 1 levels were significantly increased with an enhancement of autophagy as revealed by electron microscopy. In multiple linear regression models, only TGF- β 1 was observed in the final model where it explained the 62.3% variability of Beclin-1. In conclusion, the ovarian level of TGF- β 1 might be a determinant factor of beclin-1 level in PCOS which may provide new insight into the pathophysiology and therapy of the disease.

Keywords: Autophagy, Estradiol, Follicle-stimulating hormone, Luteinizing hormone, Oxidative stress, Progesterone, Protein carbonyl content, Reactive oxygen species (ROS), Testosterone, Total antioxidant capacity