Antidepressants induce toxicity in human placental BeWo cells

Abstract

Selective serotonin reuptake inhibitors (SSRIs), serotonin and noradrenaline reuptake inhibitors (SNRIs), and noradrenergic and specific serotonergic antidepressants (NaSSAs) are broadly used for the treatment of depression. Depression is one of the most common psychiatric disorders in pregnant women and SSRIs are commonly prescribed for depression during pregnancy. The placenta regulates the transport of nutrients and oxygen between the maternal and fetal circulation, and is essential for the survival and growth of the fetus. The present study investigated the effects of antidepressants on human placental BeWo cells.

BeWo cell viability was significantly decreased following exposure to sertraline (SSRI), paroxetine (SSRI), fluvoxamine (SSRI), and duloxetine (SNRI), whereas escitalopram (SSRI), venlafaxine (SNRI), and mirtazapine (NaSSA) showed little or no effects. Extracellular lactate dehydrogenase activity was increased by sertraline, paroxetine, fluvoxamine, and duloxetine, indicating toxicity to the cells. Sertraline increased the production of cellular reactive oxygen species (ROS) and decreased the mitochondrial membrane potential. Sertraline decreased the cellular ATP content in a time and concentration-dependent manner. Caspase-3/7 activity and apoptotic cells, detected using the phosphatidylserine-specific fluorescent probe Apotracker Green, were increased by sertraline.

Our findings suggest that antidepressants, such as sertraline, paroxetine, fluvoxamine, and duloxetine, induce toxicity in human placental BeWo cells. Sertraline may induce ROS-dependent apoptosis in human placental cells. These results are useful for further studies to determine the optimal dosage of antidepressants for pregnant women.